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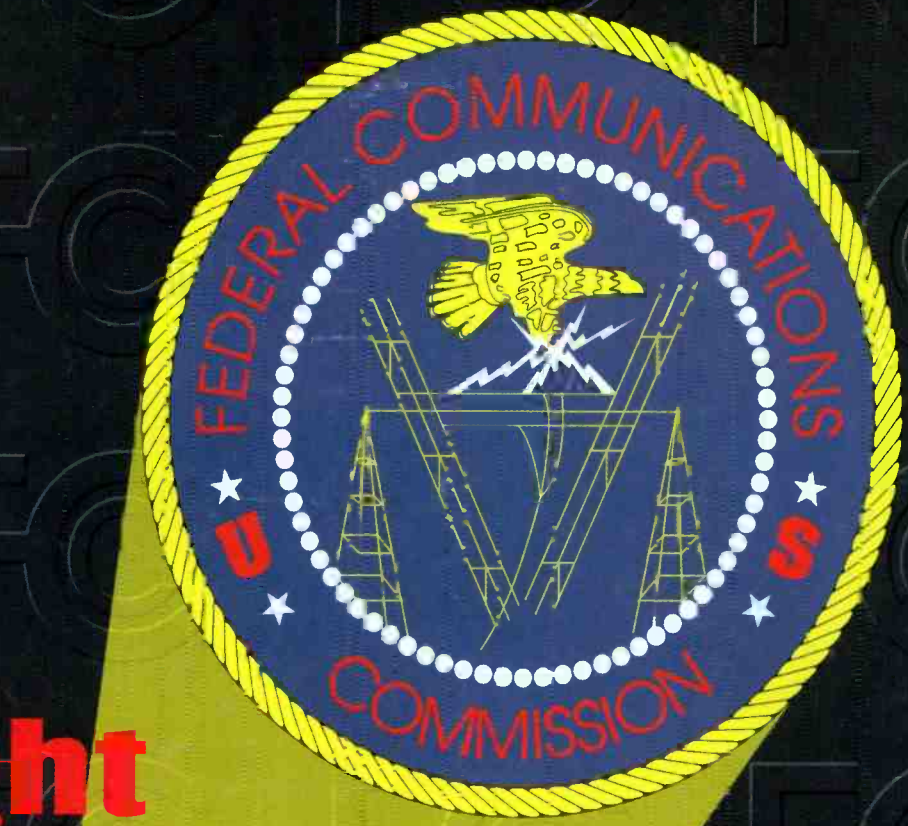
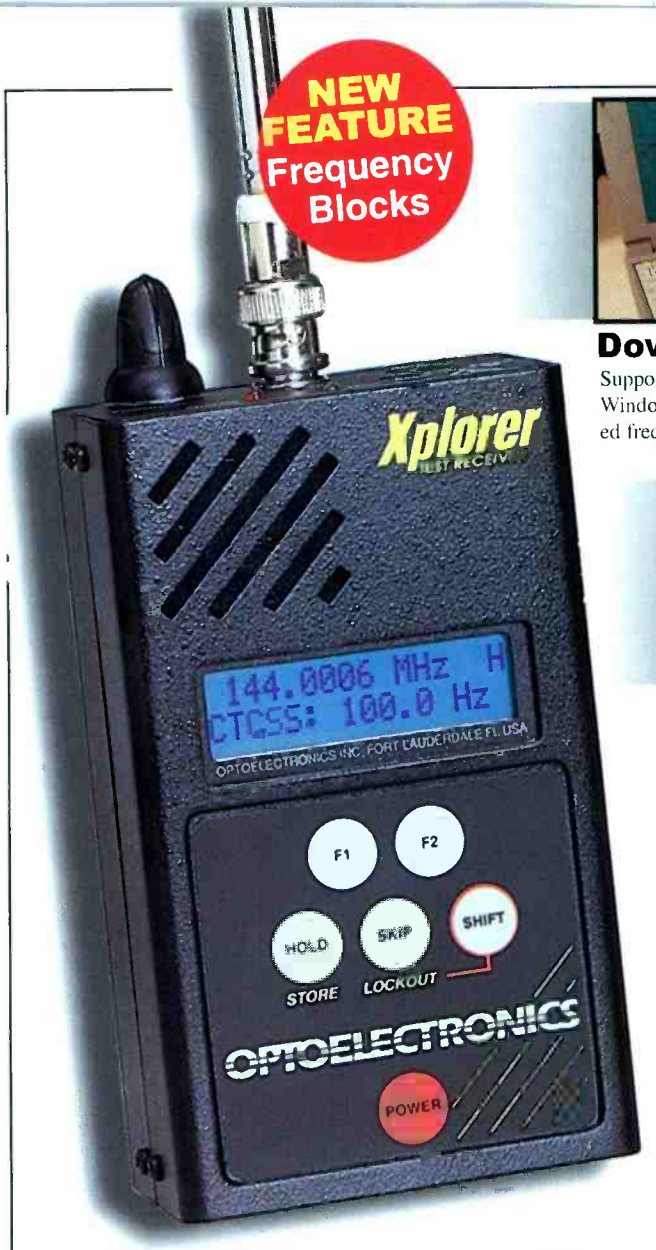
Monitoring Times

Your Personal Communications Source



Spotlight on FCC

MT Reviews:
Sony ICF-SW07 Portable
OptoElectronics OptoCom



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Monitoring Times
Vol. 18, No. 5 May 1999

Cover Story

Compliance Enforcement at the FCC

By Hans Johnson

"Welcome to the FCC Columbia Operations Center" reads the sign outside the Federal Communications Commission's one remaining manned HF monitoring station. How is this agency able to fulfill its duty of safeguarding broadcast and communication signals in the new "lean and mean" FCC? See page 8 for an inside look at how modern radio direction-finding can pinpoint signals from the other side of the continent.

In spite of stepped up enforcement activities, staff reductions, and on-going reorganization, the FCC is on the hot seat in front of the congressional committee charged with its oversight (see *Closing Comments*). So this month we focus on the FCC and also on various aspects of direction-finding.

CONTENTS

Reviews:

In addition to the computer-controlled OptoCom on page 20, *MT* is proud to be the first to review another innovative product — Sony's ICF-SW07 ROM-tuned portable HF receiver. Magne gives the clamshell-design radio high marks for a travel portable, although it's a little pricey (p. 90). Bob Grove reviews the internal VHF/UHF converter for the JRC NRD-545 on page 96. For aero fans who are dabbling with ACARS reception, Catalano finds SkySpy software helps smooth the way (p.88).

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WASHINGTON WHISPERS

By Fred Maia, W5YI
fmaia@cwixmail.com

The Wireless Privacy Enhancement Act of 1999, HR514, introduced by Rep Heather Wilson of New Mexico passed the House on February 25th by a vote of 403-3. Like previous attempts at suppressing scanner use, the bill directs the FCC to do what it already has done in a number of regulatory proceedings. The bill requires the FCC to deny equipment authorization to scanners capable of receiving transmissions in the cellular and Personal Communications Services (PCS) — already denied as a result of previous legislation, although Congress has been pointedly critical of poor FCC enforcement in this area.

The bill prohibits modification of scanners in a manner that would cause the equipment to fail to comply with FCC regulations. Such modification is already illegal because authority to operate a Commission-authorized device only applies if the device is not altered from the version the FCC authorized.

The bill says the FCC "may adopt" regulations necessary to enhance privacy on frequencies shared between commercial mobile radio services and public safety radio systems. It directs the FCC to consider requiring warning labels on scanners, an idea the FCC once considered and rejected.

Under current law, unauthorized interception of radio signals can be permissible if the content is not disclosed. The bill would prohibit the unauthorized interception of communications even if the content is not disclosed.

This is one of the biggest changes to eavesdropping laws in years, and could hit the various scanner and shortwave hobby publications that print digests of message traffic. (See **www.grove-ent/com/mt514.html** for the full bill)

One politician definitely not in favor of establishing a Low Power FM broadcast radio service is Rep. Billy Tauzin, Republican of Louisiana and sponsor of the wording in HR514. Tauzin is the top Republican overseeing telecommunications policy. He chairs the powerful House Commerce Committee's communications subcommittee.

Tauzin believes the plan to establish what could be thousands of small "microradio" stations on the FM broadcast dial "...would reduce the audience and advertising revenue of current stations and possibly create severe interference." He said "The FCC is an agency out of control that demands congressional action to straighten it out." Tauzin said he planned to introduce legislation to revamp the agency's "structure and powers."

FCC Chairman William Kennard urged Tauzin to talk to the educational, religious and community groups that support the microradio plan before opposing the idea. "There is enough room for the voices of churches, schools, and neighborhood groups as well as established radio companies."

Taxing Internet online commerce is a certainty that is coming. There will be just too much money changing hands online for there not to be. The only questions are how and when.

Right now, though, they can't even decide on the makeup of the commission which is to provide guidance to Congress. According to the law which established it, the Advisory Commission on Electronic Commerce must have eight members from private industry, eight from state and local governments — including at least one from a state with no sales tax — plus the commerce and treasury secretaries and the U.S. trade representative.

But whoever appointed the commission members bungled the job. Currently it has the three federal officials, plus nine members from industry and seven from state and local governments, none from a state with no sales tax. State and local governments are not happy and have vowed that there will be no meetings until the difference is cleared up. So far, none of the private industry appointees has volunteered to step aside.

The committe was supposed to begin work three months ago. The three year moratorium on new Internet taxes is due to expire 2001.

Pirate Radio "Vibes 89.1 FM" has been shut down. Working with the US Marshals Service and the United States Attorney, the FCC seized radio equipment used in the operation of an unlicensed FM radio station in Oakland Park, Florida, on 15th January 1999. The seizure of the equipment followed numerous FCC warnings to the operator about the penalties for unauthorized broadcasting and attempts by FCC agents to have the station voluntarily discontinue transmission.

Stating that operational misconduct will not be tolerated, the FCC has ordered three Amateur Radio repeaters located on San Francisco Bay area's Grizzly Peak off the air for at least the next 4 months.

The repeater operator suspension is based on the Part §97.7 requirement that every Amateur station have a control operator who must (§97.105) "...ensure the immediate proper operation of the station, regardless of the type of control."

According to the FCC, the Grizzly Peak control operators have for almost a year allegedly not only permitted, but encouraged use of the repeater by unlicensed operators; rebroadcast of cordless telephone calls, playing of music ...and profane and obscene language on the amateur airwaves. There have even been extended communications between the control operator and unlicensed stations ...all in violation of the rules.

The FCC ordered the system shut down as of February 28th, charging that the control operator assigned has not only invited unlicensed operators to use the repeater but has encouraged jamming and does not require operators to comply with the rules.

The FCC has sent violation notices to two ham operators who had used their stations to engage in illegal shortwave broadcasting on 6955 kHz. Cited were Henry L. Landsberg, WB6MEU, (Advanced Class) of Sierra Madre, California, and Richard F. Jurrens, KC5RGK, (Technician) of Katy, Texas. Also charged were two non-hams.

Landsberg and Jurrens were both cited for operating on a frequency not authorized by their Amateur Service licenses. In both cases, the Commission used radio direction-finding techniques to track the source of the 6955 kHz music transmissions. Landsberg and Jurrens both admitted that they had been responsible for the shortwave music transmissions broadcasted from their homes. Jurrens was charged with operating a station identified as "Rock It Radio."

The FCC has suspended the HF operating privileges of Walter P. Miller, Jr., W2YEE (Advanced Class) of Edison, New Jersey, for a period of six months. In a letter to Miller, the FCC's Riley Hollingsworth said that on Feb. 4th and 5th "...you were apparently broadcasting and talking to no particular station for several hours, during which time you prevented the use of the frequencies by others and maliciously interfered with other stations attempting to use the frequencies."

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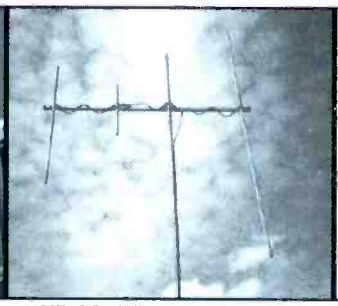
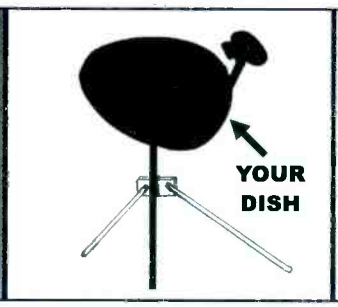
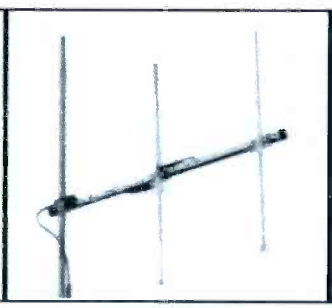


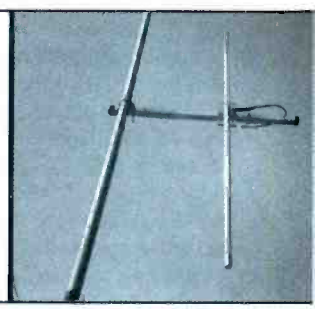
HD-SCANNER-WB-OMNI-F



HD-TV/FM-S.OMNI-F



HD-146-V3-U



HD-6M or 10M-WB-OMNI-U

CATEGORY/MODEL	FREQ/COV(*)	DESCRIPTION	CONN.	dB GAIN	DIMENSIONS BOOM	DIMENSIONS LG EL	WEIGHT (LBS)	WINDLOAD (SQ FT.)	POWER RATING	SHIPPING WEIGHT	OUTSIDE OHIO	OHIO (7% SALES TAX INCLUDED)
BROADCAST TV/FM — SCANNER												
HD-TV-VHF/UHF/FM-F	TV CHNL'S 2-69 FM-Stereo	Compact, Long Range, Full Coverage TV VHF/UHF/FM The ultimate antenna for the new digital high definition Television (HDTV) Broadcast. VHF low 10dB, Hi 12dB; UHF 21dB	F	(**)	88"	108"	7.5	1.5	N/A	12.5 LBS.	$279.95	$298.14
HD-SCANNER-WB-OMNI-F	25-1300 MHZ	Long Range, ***Continuous Coverage*** Top or Side ### Mount to Mast/Tower *### no add'l hardware needed (Still Omnidirectional)*	F	(**) 6.2 dB	67"	90"	7.5	1.9	N/A	12.5 LBS.	$154.95	$165.75
HD-TV/FM-S.OMNI-F	TV CHNL'S 2-69 FM-Stereo	Unique 'Steerable Omnidirectional'! Mount Almost Anywhere onto Wall or Mast (***) On/In Rooftop/Attic/Existing Satellite Dish Mast Mount/Side of House/Closet/Etc.!	F	Unity (**) 5.2 dB	N/A [ant.19"(h) x 40"(w) x 3"(d)]	30"	1.0	0.2	N/A	3.0 LBS.	$93.95	$99.47
											HD-TV/FM-S.OMNI-F CLAMP KIT	$24.95	$26.35
HAM-VHF YAGI												
HD-146-V3-U	142-150 MHZ	End Mnt, 3 ele. Vert. using mast/tower for reflector Detailed, easy to follow, stacking instructions included for even higher gain!	U	12 (15 dB if stacked!)	36"	36"	3.5	0.4	600 W	6.5 LBS.	$134.95	$143.35
HAM-WB-OMNI VERTICALS — SIDE ARM MOUNT WITH HARDWARE INCLUDED												
HD-10M-WB-OMNI-U	26.9-30 MHZ	Top or side mount. S.M.I.A. (##) 3.1 (HAM) dB: 10.6 ("CB LINGO") dB	U	(#)	72"	204"	5.5	1.6	1000 W	10.5 LBS.	$149.95	$160.45
HD-6M-WB-OMNI-U	50.0-54 MHZ	Top or side mount, S.M.I.A. (##)	U	(#) 3.1 dB	42"	108"	3.5	0.9	1000 W	8.5 LBS.	$134.95	$143.35

Prices include S&H in Continental U.S.

NOTES: (*) For Ham antennas, usable frequency range transmitting with an SWR of 1.5:1 or less, typically less than 1.2:1. Frequency Range shown is usable without retuning the antennal No tuning is required for any Nil-Jon Antenna: just assemble and install using the guidelines in your instruction manual.

(**) With TV/FM and Scanner Antennas, most manufacturers are very vague about what to expect for performance or gain, and gain figures given seemed quite high for results obtained. All competitive models tested were below Nil-Jon's performance. Even several different manufacturers' largest TV antenna models (close to three times our size) (including one model that claims a 200 mile range!), fell short on an overall total performance basis, of the consistent performance obtained from the Nil-Jon's Compact 7'4" TV model! Nominal gain figures are shown for our antennas.

(***) With optional Mast Clamp Kit

(#) Other antenna companies claimed gain figures which seemed quite high for the results obtained, and the Nil-Jon Antennas substantially out performed them. Nominal gained figures are shown for our antennas.

(##) S.M.I.A. means Support Mast Interaction Adjusted. Every Nil-Jon Antenna uses calculations for the interaction of other objects, such as your own mast.

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"Road warriors" in state of transition

Many urban areas have been blessed with trained volunteers who devote countless hours tuned to their radios in order to respond to motorists in distress. Often they work in tandem with road patrols who may be trained as first responders and equipped with basic auto tool and medical kits.

However, recognizing the importance of roving vans or emergency response operators during rush hour, some cities are mounting their own units, sometimes replacing the volunteers. Trouble is, they're not always as well trained or as flexible as the volunteers. And, while they may have faster access to helicopters or emergency vehicles, they may forget to interact with the volunteers, who are usually part of experienced teams like REACT (Radio Emergency Associated Communications Teams), CVS Samaritans, Emergency Services, Commuter Assistance Network, and many others.

These volunteers monitor a mixture of citizens band (CB), general mobile radio service (GMRS), and amateur radio frequencies — as well as VHF and marine frequencies where appropriate. GMRS has been the service favored by REACT members, because of the lack of congestion on the channels and the area that can be covered by the GMRS repeater network.

But this, too, may be changing. REACT is concerned about the FCC's loosening regulations on the use of GMRS repeaters. They are concerned because, according to recent revisions, any licensed GMRS user may now operate on any GMRS frequency on any repeater. The FCC did retain the limitation that the nationwide 462/467.675 pair is for use through repeaters only, so that it remains the primary channel for emergencies and travelers assistance.

Responding to apprehensions voiced by some users, the FCC denies it has any plans to make GMRS an unlicensed service like the citizens band.

Volunteers track interference

A security guard in Hartford, Connecticut, was charged with 45 counts of criminal mischief, interfering with police and breach of peace after he was finally located by a volunteer radio tracking team called Capitol Region Malicious Interference Tracking (CRMIT). The group had fingerprinted Joel Langdo's radio transmissions which confirmed that the profanities, music, moaning, and other noises which had interfered with at least 35 frequencies on hundreds of occasions came from his radio, which had been illegally altered. Langdo apparently made the transmissions while at work "as a joke."

The police lieutenant said such cases didn't happen often. The CRMIT assists in around 15 incidents each month, most of which involve accidental interference.

Next best thing to being there

Watching a NASCAR race on television just isn't the same after you've been there in person with your scanner. But now you can still tune in to the scanner action over the Internet. The Charlotte, North Carolina, company MotorTrax interactive (MTi) purchased exclusive rights in May 1998 to distribute NASCAR Online in-car audio over the internet. The company has also signed licensing agreements with 25 top NASCAR drivers, including Jeff Gordon, Dale Earnhardt, Rusty Wallace and Dale Jarrett, so you can pick who you want to hear.

The current price is $4.95 per event; go to **www.motortrax.com** to log in.

Shrouded history of VOA site

The Voice of America's Greenville facility, shut down in 1995, transferred ownership in March to East Carolina University. Professor Byron Burlingham, who is helping with the transition, learned that, of the 98 antennas on the property, only one was used for transmitting: Greenville was primarily a receiving and listening site. Incoming radio programs were relayed to two nearby transmitting facilities. The site did route messages from US embassies, but VOA officials refused to discuss what other agencies or types of communications may have been handled at the tightly-guarded 594-acre facility.

The VOA disposed of the facility because satellite systems have largely replaced radio receiving equipment. ECU plans to use the property for the "Millennium Campus," with graduate-level programs, medical clinics, an institute for agromedicine, residential area for retired professors, wetlands preservation, and athletic training center.

BULLETIN BOARD

May 1: St Louis County, Missouri
All-day training Severe Weather Observation seminars. SKYWARN level 1 in a.m., Level 2 in p.m. Level 1 taught in evening class on March 23; new class on Severe Weather Safety evening of April 14. For locations and information call 314-889-2857 for taped message. Classes open to anyone at no cost.

May 1: Cedarburg, WI
The Ozaukee Radio Club's 21st annual Cedarburg Swapfest at the Circle-B Recreation Center, Hwy 60 and County I (20 mi. north of Milwaukee); talk-in 146.37/.97 and 146.52. 8a.m. to 1p.m.; admission $4. SASE to Joe Holly, 1702 Holly Lane, Grafton, WI 53024, 414-377-2137 or Skip Douglas 414-284-3271.

May 1-2: Abilene, TX
West Texas Section convention and Key City ARC hamfest. For more information about location and reserving dealer space, leave a message at 915-672-8889 or visit **http://www.westex.net/kcarc/hamfest.html**

May 2: Hagerstown, PA
The Great Hagerstown Hamfest, sponsored by the Antietam Radio Assoc, at the Hagerstown Community College Athletic and Recreation Building. Contact Tina Jones KB8ZQM, (304) 728 7769, *kb8zqm@intrepid.net*; **www.erols.com/rjlong61/ara**. Talk-in 147.090+ ; 8a.m.-3p.m., $5 adm.

May 15: Grimesland, NC
East Carolina Antique Radio Club "ECARC Radiofeast" in E Carolina Radio Museum parking lot, 7602 Pitt St., Grimesland, NC, Hwy 33, 10 mi east of Greenville. 8 a.m. to 3 p.m. FREE admission, tailgate space $7. For information call Bill Engstrom 252-355-8732 or Herman Schnur 252-752-2264.

"Privacy Czar" in Washington

Vice President Al Gore has named an Ohio State law professor as the nation's first "privacy czar." His job will be to help the Clinton administration, the federal government, and the states to discuss privacy issues such as the selling of Dept. of Motor Vehicles information to private companies. He will likely have a hand in privacy bills relating to the issue of electronic access to financial and personal information. Privacy of information in the Internet has also become a big concern. Wonder if this new czar knows anything about radio waves?

New ham in Congress

Greg Walden, WB7OCE, elected to Congress from Oregon's second Congressional district of Oregon, was sworn in March. He replaces Rep. Bob Smith, who retired last year. No stranger to the Capitol, Walden served as Smith's chief of staff from 1981 until 1987. Walden is an American Radio Relay League member and broadcaster who owns several radio stations in Oregon. Previously, he served in the Oregon legislature.

Bottom feeders

"Want to hear your what your neighbors are saying? Then pick up this handy eavesdropping device scanning radio. You can also hear military and commercial aircraft." So, we are told, went a radio ad for the SportCat scanner which aired on the Howard Stern show on the Entertainment network. While such a blatant pitch to the lowest element of human nature might be expected on the shock jock's show, it is also very probably illegal. Promoting a device for the purpose of illegal interception is against the law.

Most folks know it's illegal to monitor cellular frequencies, which are supposed to be blocked in the SportCat. But many people — and even many courts — still think monitoring cordless phones is allowed. A Michigan court, for example, just overturned a circuit court which had ruled that under state law conversations intercepted from a cordless phone are not private. Under *federal* law, there's no question about it.

In the same month, the TV cartoon "The Simpsons" showed Marge Simpson becoming hopelessly hooked on listening in on the neighbors by listening to a baby monitor.

Once again, media uses the sleeze factor to pull an audience and make a quick buck — and adds more incentive to enact legislation like HR 514 that will injure legitimate users.

Satellite customers could get reprieve

Satellite customers who lost Fox and CBS channels or are due to lose them April 30th may get a reprieve until Dec. 31. The Senate Commerce Committee approved a bill (S-303) which would delay the action and restore the channels to the 700,000 customers who have already lost them due to an order from a federal court in Miami. It would also prevent other networks from following suit.

S-303 would give satellite TV customers (for the first time) the right to receive local TV stations on their satellite systems. After Dec. 31, customers who can not receive a local network channel by rooftop antenna or by cable would be permitted to request a waiver to receive non-local network channels.

The battle has just begun to get interesting!

Signs of the times?

Eric Cooper reports listening to the "Sincerely Yours" mailbag program on Radio Netherlands on Sunday night when the two hosts were congratulating one of their correspondents on receiving his 5000th QSL. One of the hosts said "I am not even sure what the letters 'QSL' stand for" to which the other host replied, "I think its some kind of reception report or something."

John Tuscherer

MT columnist Kevin Carey noted with deep sadness the passing in March of the man who has been his mentor since 1985. John Tuchscherer of Neenah, Wis., was a DXer of over 60 years who was always willing to "Elmer" younger hobbyists in the nuances of DX.

John was a distinguished veteran of World War II, serving with distinction in the US Army Air Corps, overseeing radio communications installations on Kwajelein, Majuro and Iwo Jima.

His legacy in the radio monitoring hobby is immense and varied. He was one of the first "armchairs" to study the vagaries of propagation; he was a ferocious QSLer who had thousands of cards in his collection. He was one of the first to write reception reports in Spanish, and his knowledge of Peruvian tropical stations was enormous.

His research of radio propagation conditions as they related to DXpeditions resulted in astonishing catches worldwide. John was a key figure in IOTA (Islands on the Air) and may have been credited with being the shortwave DXer with the most IOTA QSLs. John Tuscherer was 88.

DX awards

The Association of North American Radio Clubs ("ANARC") has renamed its DXer of the Year award to recognize the accomplishments of ANARC's first Executive Secretary, Don Jensen. The first Don Jensen Distinguished Service Award was presented at Winterfest 1999 to John McColman for his many years of dedication to the listening hobby. While best known for his research in scanner monitoring, John has been a monitor of all portions of the spectrum for many years. McColman is the author of numerous books, and is well known for his work with the former Northeast Scanning News (NESN) and currently with the All Ohio Scanner Club.

Certificates of Recognition were also given to Bill Oliver, Bob Brown, Harold Cones, and Kris Field.

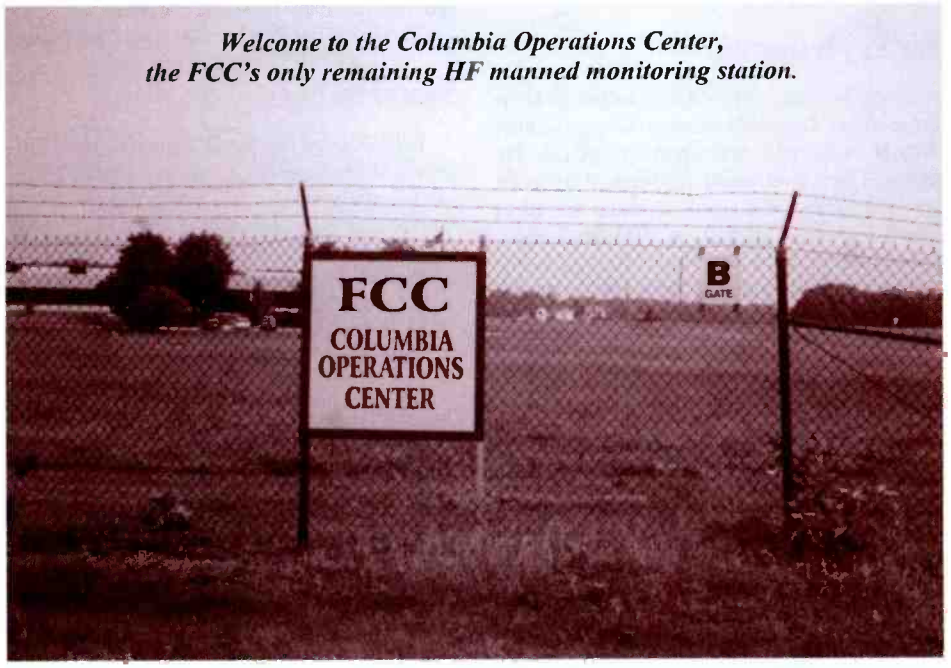
"Communications" is a collaboration between Rachel Baughn, mteditor@groveent.com, and these fine reporters: Anonymous, NY; Jim Boehm, TX; Chet Copeland, via email; Ken Dupuis, NY; Dean Hale, via email; Richard Johnson, PA; Kevin Klein, WI; Bob Leef via email; Fred Maia, W5YI, TX; Mark Meece via email; Ed Muro, NY; Ira Paul, MI; Doug Robertson, CA; Ed Schwartz, IL; Richard Sklar, WA; Walt Szczepaniak, PA; Larry and Gayle Van Horn, NC; William White, NC; *ARRL Report*

COMPLIANCE ENFORCEMENT AT THE Federal Communications Commission

By Hans Johnson

The government's Federal Communications Commission (FCC) performs a variety of tasks, but none are more familiar to *MT* readers than the commission's work in busting illegal pirate stations. Yet the FCC has gone through a recent reorganization that downsized the agency significantly. Until last October, there hadn't been a shortwave pirate apprehended in years.

The network of manned high-frequency (shortwave) monitoring stations, created in 1941 to find illegal stations and spy transmissions, has been reduced to a single manned station. So how is the FCC's Compliance and Information Bureau (CIB) carrying out its enforcement duties now?



Welcome to the Columbia Operations Center, the FCC's only remaining HF manned monitoring station.

Lean and Mean

The network of monitoring stations ranging from Puerto Rico to Hawaii is no longer manned, but it is equipped. CIB now remotely controls this net. During business hours, that takes place at the FCC's Columbia Operations Center in Maryland. Located about halfway between Baltimore and Washington, the Center is just a few miles from highway I-95. Once in the countryside, it is now crowded by the growing city of Columbia. "Our noise floor gets higher every year," laments Charles Magin, district director.

It's hard to imagine a high frequency direction finding (HFDF) site without an elephant cage, the old modified Wullenweber antenna, but the FCC has gotten rid of their cages and replaced them with a better antenna of their own design. The interferometric antenna hardly looks like an antenna!

The farmhouse that became the FCC's Columbia monitoring station.

Eleven elements that look like fence post are arranged in a V, each leg being 1000 long. Starting from the bottom of the V, the distance between each element is double the distance between the two previous elements. It works similar to a phased array, with each element taking its own measurement of the signal.

Some rhombics, once used for program monitoring during World War Two, plus some other shortwave antennas, continue to stand but really aren't used. The new "I" antenna is the new workhorse of the site.

The next stop is the HFDF group building — actually a couple of trailers. As a result of the reorganization, Columbia quickly outgrew its original buildings. "It takes an act of Congress to construct a building, so trailers were the way to go," explains Charlie Magin.

The FCC Casts a Wide Net

Dave Larrabee, chief watch officer, dove right into our topic. "We know where the pirates on shortwave are," he says. He then explains how easy it is for the FCC to DF something on shortwave.

The HFDF group consists of three identical consoles. From any of the consoles, an officer can control receivers at FCC sites from Alaska to Hawaii to Puerto Rico, as well as a variety of sites in the contiguous United States. He can monitor the output from two different sites at the same time and instantly conduct direction finding against any shortwave signal he chooses. The commission's sites are all equipped with Watkins Johnson WJ 8711s, the government version of the HF-1000.

The WJ in the pictures is a dummy of sorts.

The FCC's new type "I" antenna.

By tuning this unit, the officer can set the receivers for other receivers in the net. He can also do it via the keyboard, but the operators prefer using the dummy.

We proceeded to run a DF against a station in an aeronautical band. One push of a button and azimuths start shooting across a map a computer screen. Within seconds it is pegged down to a 10 nautical mile radius. If the officer is not satisfied with the automatic fix he can manually refine the data, accepting some azimuths and rejecting others.

Throughout his shift, the officer will run several such test fixes to make sure that the system is operating accurately. The computer is loaded with a pile of maps so that the officer can get a good picture of the area in which the station is operating.

The HFDF system is most often used for interference complaints on the aeronautical or maritime bands. Officers are given a list of tasks or may receive complaints from the FCC's newly established national call center (1-888-225-5322).

Some of the tasks aren't complaints, but requests for help in monitoring. "We have a task to monitor the signal strength of Radio Tirana in the Chicago area," explains Dave Larrabee. It's all part of international cooperation and the Commission works regularly with its counterparts in countries such as Australia, Great Britain, and Japan.

Trailers contain Columbia's HF direction finding group.

From this high frequency direction-finding console, the FCC can remotely control its network of stations to locate signals from Hawaii to Puerto Rico.

Black Sedans

But the HFDF system can't pinpoint a pirate, and it can't do anything against microbroadcasters on the FM band. That is where the fleet of late-model sedans that the FCC has comes in, known in the commission as the MDDF, mobile digital direction finding. While Charlie Magin didn't want pictures taken of the entire vehicle, he did give me a tour and demonstration of the system.

The trunk is crammed full of gear, various computer displays and outputs are arranged in a stack next to the driver. There are no visible antennas; they're built into the roof. Monitoring signals over a wide part of the spectrum, the direction finding system tells the driver which way to go. It's also possible to display the azimuths from other vehicles on the system to get a better position.

A set of maps detail the area. Video records the scene, the mapping screen, the DF receiver screen, and the RF spectrum analyzer screen.

Our target this day was WHFS on 99.1 MHz. Luckily for them, they were transmitting as licensed from Annapolis on this day.

Columbia is also home for the FCC's satellite monitoring operations. The large dish here can view the programming on many different satellites. The FCC's success against offenders such as Captain Midnight, who interfered with an HBO broadcast, has made this a very quiet area for illegal activity in recent years.

Always Watching

When Columbia goes home for the evening, and on weekends and holidays, CIB's Communications and Crisis Management

A pod antenna at Columbia for locating interference to Washington area VHF/UHF signals.

The trunk of the FCC's direction finding sedan is crammed with gear.

Center at FCC headquarters in Washington, D.C., takes over. This is the FCC's watch center, and there is always at least one officer on duty. A few punches on a cipher lock and you are inside the door.

The Commission wouldn't allow any pictures of the Center, due to some of the secure communications gear here, but you can forget about visions of something out of the movies. The reality of the center is that this is a work area, not a glamour set. Some things look out of place and there is a distinct lack of uniformity throughout. What will catch your eye as you come in is a bulletin board filled with pictures of previous busts — both Allan Weiner and La Voz de Alpha 66 were prominently displayed.

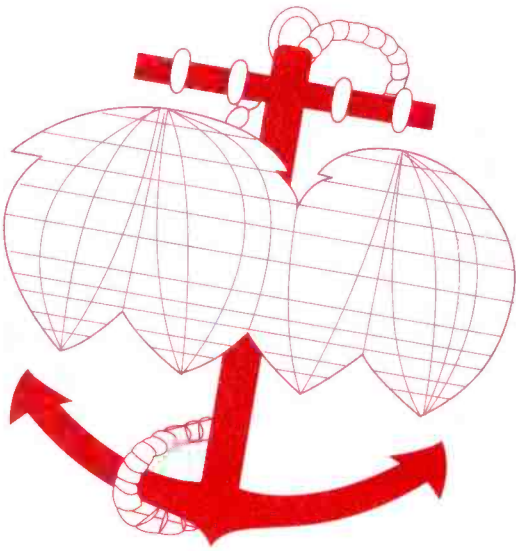
The watch officer on duty sits behind a high frequency direction finding console virtually identical to those at Columbia. So while the carpet may not match the walls, the business end of the center, the important end, is very modern.

The FADF (Fixed Automatic Direction Finding) is the VHF/UHF equivalent of the HF system. From this position, the operator can also monitor FADF systems installed in both San Diego and Boston. The system is usually used for finding sources of interference to government communications, be they federal, state, or local. The system also solves its share of complaints on the maritime channels in the latter locations, too, with one of the prime culprits being marine radios stuck in the transmit mode.

The FCC is well equipped to find stations from dc to daylight. Depending on when and where a station is operating, its location is just the push of a button away. Pirate station busts continue to draw the most attention from the media and the public. The FCC is still very active in this arena if the large microbroadcaster and shortwave raids of 1998 are any indication.

However, the FCC's work in keeping the aeronautical and maritime bands free of harmful interference deserves a great deal more recognition and credit. For without this work — which many don't know enough about to even take for granted — traveling by sea or air would be much more hazardous.

ALONE ON THE PACIFIC



Satellite tracks attempt to row around the world

By D.K. Howe

Mick Bird was tightly wedged into the bunk of his 28-foot row boat *Reach* when his Collision Avoidance Radar Detector began to wail. At first he thought someone was e-mailing him, because that same alarm announces incoming messages. But then he remembered he'd turned the receiver off. This was the real thing.

Leaping to his feet, Bird stuck his head out the hatch. Less than 550 yards away, he could see a large black vessel bearing down on him. Diving into the cockpit, Bird grabbed the oars and began to row like mad. His mind raced. He wondered if he could be seen in the light of the full moon. But even if someone saw him, it would be too late for the captain to turn the fast-moving, slow-to-respond ship. Ninety seconds later, Bird watched, his mouth wide open, as hundreds of tons of rumbling steel skimmed by, so close he could see men moving about on deck.

Mick Bird performs one of his songs at a fundraiser at the Pacific Corinthian Yacht Club in Ventura, California.

The next day, Bird took a break from his rowing to sit down at his lap top and write about the previous night's event. With a push of the button he sent his daily report out onto the World Wide Web.

"It is hard to imagine that with millions of square miles of open sea, two ships will find the same few square yards at the same few seconds."

He ended with the casual words, "It happens."

A TOUGH ROW

Mick Bird, a 41-year-old singer, songwriter, husband and father of two, is rowing around the world alone. He is a gregarious individual, a man with closely cropped hair and a round face, who loves to talk, smile, and make contact with everyone around him. So far, Bird has rowed from California to Hawaii and from Hawaii to the Marshall Islands. As you read, Bird is underway to Australia, the longest leg so far in his journey around the world.

For some reason unexplainable even to himself, Bird, who measures 5-feet 8-inches and weighs 160 pounds, has a need to place himself and his 2,000-pound, double-ended, Dutch-shoe-looking wooden vessel at the mercy of the winds and the waves — powerful forces that sometimes knock his boat about so hard that it's all he can do to hold on.

He thinks his obsession with rowing around the world may have something to do with being half Hawaiian. When he was a young boy, Bird's grandfather told him legends of the great paddlers. All he knows for sure is that the driving force comes from the *na'au*, a Hawaiian term meaning from the gut. Bird's expedition is called *na'au.*

When Bird rows he renews within himself a sense of pace, patience, and belonging. It is a way he remains connected to the ocean, the earth, people and the spirit of it all. He also reaffirms his belief that he can do anything he wants to do.

"I've got Hawaiian blood, the Hawaiian voyager, the spirituality involved. Being in that environment is really natural. It feels comfortable."

But rowing around the world is not an easy task. The ocean's winds and currents have more control over Bird and *Reach* than Bird and his boat have over them. Unlike a sail boat with huge sails that capture the wind and overpower currents and waves, Bird has only muscle, determination, and nine-and-a-half-foot oars with which to battle the forces.

Leaving Hawaii, Bird had to fight a current that insisted on pulling him back to land. Still, he managed to make sixty miles to the south, but then the current got the upper hand and pushed him north, not the direction he wanted to go. Finally, Mother Nature forced his hand and he changed course. Instead of his original destination, Kiribati, he headed for the Marshall Islands.

A MODERN HAWAIIAN MARINER

On board *Reach,* a sophisticated communication system keeps Bird in touch

Bird with Steve Gutzman, exective producer of his latest album.

with his wife, children, and a large group of followers. A computerized data management system that interfaces with the telecommunication satellite uplink system, Inmarsat/Orbcom can be found in the tiny aft cabin, crammed between the cookstove, navigation equipment, and sleeping gear. A Toshiba laptop and monitor, cellular modem, weather fax, printer and satellite uplink transceiver provide instant telex communication and up-to-the-minute satellite weather data and forecasts. The system performs complex navigational functions, tracks the vessel's maintenance schedules, and holds the ship's log.

A VHF radio allows Bird to talk with passing ships and, when close in, to contact shore. A single side band radio provides long distance voice communication, but Bird doesn't use it much because of its heavy drain on the solar-charged batteries. Occasionally though, he will pick up the mike, as he did to call his wife to wish her a happy birthday and when he did a live interview with Brickwood and Shaner on their morning show at KCNN in Hawaii.

During the leg from Hawaii to the Marshall Islands he had a camera mounted on board by CBS. Bird has been featured on the television shows *Public Eye With Bryant Gumbel*, *Extra*, *The Late Late Show With Tom Snyder*, and Discovery's *Travel Daily*.

Bird's decision to go hi-tech has been part of an evolving process.

"It's a fluid kind of thing that's changing since it first hit me to do it [row around the world]. At first, it was purely coming from a place of escaping the world, doing something adventurous, giving me a vessel to meet interesting people."

Standing in the tiny kitchen of the guest house he leases in Malibu, California, Bird leans in, touches my arm, and laughs, "Then I met Stacia and the whole thing went to hell." After Stacia came the twin girls, Kenna and Hayden. His family became the reason for communication, the communication became a reason for sharing his adventure with the rest of the world.

ALONE AT SEA

While underway, Bird posts "The Latest Report from Mick" every day. Some reports are humorous like when he wrote about the frightened hitchhiking booby bird that fell from the rail of his boat onto Bird's back, dug in its claws and hung on for dear life. Bird, the human, leaped out of

***Mick Bird explains the* na'au.**

Bird demonstrates his route across the ocean to a young fan.

his seat spinning and swiping. Bird, the booby, held on tight, squawking and flapping.

Some reports share the pain of blisters, bruises and aching muscles incurred while gliding continuously, forwards and backwards, on a sliding seat, drenched in sweat and salt, pulling on long heavy oars for eight hours a day.

Other reports tell of the beauty of the *olekukahi* moon (half moon waxing) and Bird's connection with the sea.

"I swim in the ocean every day. Actually, you might call them dips. In the morning, evening and several times during the day. The morning one is to wake me up and connect me with the ocean. I don't like feeling separate from it. During the day it is necessary to cool off, and the evening one is pretty much the last thing I do before closing shop for the day. Sometimes it's dark. I'm always lashed to the boat and just drop over. Every time I hop back up into the cockpit, I always feel a little more blessed and honored," wrote Bird in his August 12, 1998, report.

Throughout the day, Bird takes a reprieve from the grueling task of rowing and reads the incoming mail from friends and followers, like school children who ask, "What do you eat?" and "What does the sky look like out there?" The "small pockets of joy" are the ones from his wife telling him about the twins, like the one that said, "The girls pick up the phone and say, 'Papa, row, row, papa. Bye, bye.'"

THE PRICE OF ADVENTURE ...

Between legs, Bird returns to his family in Malibu. He spent nine months between Leg 1 from Ft. Bragg, California, to Hilo, Hawaii, and Leg 2 from Hilo to Majuro. During that time, he recorded a newly released album, *na 'au*, with Jackson Browne singing backup on one song, he shared in the parenting of his girls, and raised funds for his expedition, as well as the National Tuberous Sclerosis Association. Bird also spoke at schools, sharing his sense of adventure, his enthusiasm for life, and his knowledge that the seemingly impossible is possible.

Since satellite communication is pricey — a penny a character — fundraising and looking for contributors occupy a lot of Bird's time. Donning a sports jacket and jeans, Bird speaks at yacht clubs and knocks on the doors of big business like COMSAT and Toshiba. Toshiba donated the laptop, but COMSAT, a satellite communication company, has declined Bird's request for sponsorship. Their interests lie elsewhere: Around Alone, a single-handed around-the-world high-profile yacht race.

"Our vast commitment of company resources to Around Alone generally precludes us from also sponsoring other maritime events during the same nine month time frame," says Dave Groobert of COMSAT.

The $5,000-a-leg satellite communication bill may be small change to COMSAT, but it's big bucks for Bird.

"It's a very expensive process to do my daily link," says Bird. "Just to say hello costs me five cents."

... AND THE REWARDS

Besides daily reports back to his Web site, Bird talks via e-mail with school children around the country. No matter what

Someday this autograph may be a valuable part of history!

the cost, it is important to Bird to share his journey with young, growing minds.

"I believe there is a value to my mission...not only what my kids might get from it, but possibly millions of kids around the world...or adults," Bird explains. "I want to be able to say, 'You can do everything in the world that you want to do if your heart is in the right place.'"

When Bird left Ft. Bragg on the first leg of his trip, his mother gave him a *kikepa,* a black toga-like garment normally worn by Hawaiian royalty and warriors, to remind him of his culture, to keep him in touch with the ocean warrior, and to keep him warm and dry. He was to return it to her when he reached Hawaii.

Arriving in Hilo after 64 days at sea, Bird's mother was on the dock. She stood there with about 100 people: Bird's wife and children, friends, and members of the news media. Pua Kanahele's voice, a noted Hawaiian teacher and chanter, floated across the harbor while Bird rowed towards shore. When he reached the dock, Bird stood up in his boat, *kikepa* in hand and spoke. He thanked his mother for the garment that carried him safely across the sea.

"I bring it back to you in the spirit of the lone voyager," he told her.

And to the crowd he said:

Follow your heart.
Don't forget your dreams.
It can be done.
Let people help you.
And believe in yourself.
You'll be all right.

His words were interrupted by long, hard sobs that forced their way up and out from somewhere deep inside, somewhere from the gut.

Note: You may contact Bird and follow his journey at ***www.naau.com****.*

The author has exchanged a yacht in the Pacific to construct a rustic home in New Mexico. Other articles for MT include a profile of Barry Goldwater and marine radio topics.

On the road with GPS and Intelligent Transportation Systems

By Russell W. Steele

Would you recognize an Intelligent Transportation System if it was parked in your driveway? Never heard of ITS? Few citizens have. Those that have, show little interest, even though the US Department of Transportation launched a major initiative in 1991 to integrate vehicles and highways into Intelligent Vehicle Highway Systems. This label was later shortened to Intelligent Transportation Systems (ITS), reducing the emphasis on highway centered solutions to traffic congestion.

The 1991 Intermodal Surface Transportation Efficiency Act called for a system capable of reducing traffic congestion, improving air quality and traveler safety. After spending millions on research and demonstration programs, citizens are not clamoring for automated highways with autonomous vehicles, automatic mayday systems and hand held multi-modal traveler information systems. As one ITS Consultant noted, "More people know about alien abductions than they do about ITS."

While few products carry the "ITS" label, consumers and businesses are being offered products that implement ITS concepts. Many of these "telematic" products, combining GPS position and timing with radio communications, are improving transportation efficiency, enhancing traveler safety and increasing customer satisfaction. However, these onboard systems are not often recognized as ITS products.

Some consumer-related ITS products offered in high-end-cars are: GM's OnStar, Ford's RESCUE and Siemens' TetraStar. Public transit vehicles equipped with GPS systems are providing better customer service and increased efficiency. Long haul trucking companies are using GPS to improve fleet management, reduce thefts, and monitor driver and vehicle performance.

GWEN Tower and GPS antennas at Appleton Washington, used to demonstrate NDGPS concept.

Small businesses are also adopting GPS technology to improve efficiency and customer satisfaction. A few months ago, I ordered some new rain gutters. When the estimator arrived in his pickup truck, he had a home-built console in the passenger seat with a laptop computer, mapping software, and a GPS sensor on the dashboard. He estimated this under-$200 system saved him forty-five minutes to an hour every day. However, in his opinion the best feature was improved customer relations by projecting more accurate arrival times.

LeafGuard home built navigation console, with Tripmate GPS on the dashboard.

Consumer vehicle applications

General Motors' OnStar service is a hands-free, voice-activated cellular phone, combined with a GPS navigation set. The driver is linked to a service center where operators can locate the car on a computer workstation display and respond to the user emergency. When an air bag deploys, the car's system automatically notifies the OnStar Center of the vehicle location. The operator can call the car to check on the occupants' condition. Depending on the need, the operator notifies the nearest emergency response unit or dispatches a tow truck to the scene of the accident.

Also, OnStar subscribers can get immediate remote diagnostics of the vehicle's engine, power train and brake system, if a warning light flashes on the car's instrument panel. The system also detects any unauthorized entry into the vehicle and tracks the stolen vehicle. Using GPS navigation information relayed by cellular phone, the service center can notify the police of the vehicle's location. OnStar is a 24-hour, seven-day-a-week service in all 50 states and Canada.

While GM has OnStar, Ford has developed its own onboard emergency communication system for the Lincoln Continental, called Remote Emergency Satellite Cellular Unit (RESCU). Lincoln Continental's overhead console has a button for requesting a tow truck or ambulance. When one of the buttons is pressed, the integrated hands-free, voice-activated cellular phone automatically sends an electronic message to the Lincoln Security Response Center. This message includes the longitude and latitude obtained from the vehicle's GPS navigation system. This is also a 24-hour, seven-day-a-week service.

RESCU's capabilities are more limited than OnStar's. RESCU does not have convenience features such as directions, remote unlocking, theft tracking, and hotel/restaurant services. However, Motorola Telematic Information Systems and Visteon Automotive Systems (a subsidiary of Ford Motor) recently announced a new vehicle emergency messaging system, designed for aftermarket installation on selected new vehicles. The system offers emergency and roadside assistance, turn-by-turn route guidance, theft-tracking assistance, theft alarm, and door unlock capabilities like OnStar.

The Seimens TetraStar Traveler Information System is a more stand-alone system with a GPS sensor and an internal gyroscope for accurate vehicle positioning. It provides turn-by-turn navigation instructions from on board data. The system includes a four inch LCD display, on-board computer with roadway database and map displays. TetraStar was showcased during the 1997 Summer Olympics in Atlanta. In a Battelle Research Center survey of participants, better than 80% of the respondents would consider installing TetraStar in their vehicles. Some 86% felt the system reduced overall stress

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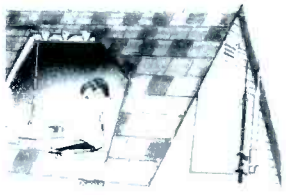

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brought on by traveling and 96% said that TetraStar, in general, made driving easier for them.

According to a recent Strategis Group survey of the Automatic Vehicle Location (AVL) market, technological improvements and declining prices are expected to boost the number of passenger cars equipped with telematics from 58,000 in 1998 to over 1.2 million by 2003.

Transit vehicle applications

Bus fleet operators need to know where their buses are, and whether drivers are meeting route schedules. Real time vehicle tracking systems accomplish this by coupling GPS navigation systems with radio communication links. In one demonstration, Kansas City saved $400,000 in operating expenses and cut the response time to emergencies from four minutes to one minute by installing AVL technology on 200 buses.

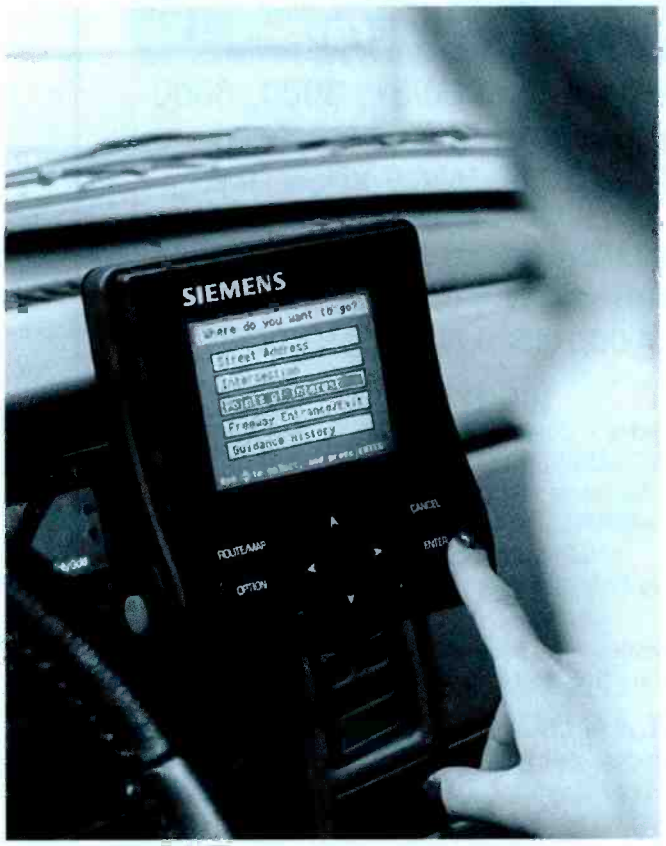
Commercial trucking applications

Loaded trucks are favorite prey of thieves. Today large corporate truck fleets — J.B. Hunt, Schneider National, and Yellow Freight — all rely on AVL technology. However, less than 1 percent of the 5.7 million private fleets carry automatic locating systems for reporting a truck's locations to dispatchers. When an AVL-equipped truck is stolen, the truck's exact whereabouts can be reported to the police by the dispatcher (assuming the system is not disabled).

The adaptation of the truck-tracking technology to a theft-recovery system is a natural, but far from its only use. The Iowa Department of Transportation is working on a program to log the miles interstate truckers run in each state, for fuel-tax reports. On-board computers with GPS sensors can also track a driver's service hours and make an electronic log that's easier to keep and harder to fake.

Problems to be overcome

Selective availability. GPS satellites broadcast two signals, one military and one civilian. In order to deny adversaries the accuracy that we provide our own soldiers, the civilian channel employs selective availability (SA), enabling the military to control signal accuracy. When SA is set to its highest point, it limits the civilian channel accuracy to a radius greater than 100 meters. Normal SA settings produce accuracies within 100 meters. With SA set to zero, accuracy should be within 15 meters.



Siemens, TetraStar Traveler Information System display unit.

Single frequency. Transportation agencies and business are building mission critical functions which rely on GPS timing and navigation signals. Mission critical safety systems require a backup capability; this is especially true for aircraft operations, train separation monitoring for positive control, and large ship operations in bad weather. Therefore, two or more GPS signals are desired for these mission critical applications. Two signals can also improve reception when signal levels are marginal.

Standards. Standards are a major ITS issue. A great many standards have reached the point of public comment and balloting. However, even as industry praises the standards process, an undercurrent of reservations and market concerns is slowing progress. Once again, as we experienced in the computer and video industries, consumers maybe called upon to set the final standards with their checkbook and credit card.

Some solutions on the horizon

Last June Clinton signed into law the compromise ISTEA (Intermodal Surface Transportation Efficiency Act) reauthorization bill, dubbed the "Transportation Equity Act for the 21st Century" or "TEA-21." The legislation includes a nice present for GPS users. TEA-21 includes funding for a nationwide differential GPS system (NDGPS).

Nationwide Differential Global Positioning System. When complete, the NDGPS will provide nationwide differential signals from 66 sites around the country. It will be integrated with three existing Federal differential GPS systems: the Coast Guard's DGPS system used in harbors and major rivers, the National Geodetic Survey's Continuously Operated Reference Station (CORS) system for tracking shifts in the earth's crust, and the National Oceanic and Atmospheric Administration's Integrated Precipitable Water Vapor System for collecting real-time water vapor data.

To reduce the cost and accelerate NDGPS deployment, TEA 21 directs the Air Force to transfer its 53 Ground Wave Emergency Network (GWEN) sites to the Department of Transportation in 1999, when they are scheduled to be decommissioned. An excellent use of our tax dollars, this 30 million dollar system of 66 stations will provide dual frequency differential coverage, 99.9 percent availability and 1-5 meter accuracy.

Additional Frequencies. The Department

of Transportation (DOT) and Department of Defense (DOD) have agreed to provide additional frequencies for civil use. The second civilian signal will be located at 1227.6 MHz along with the existing coded military GPS signal.

A third civilian signal, exclusively for civil aviation, will be at 1176.45 MHz. This signal is in a portion of the spectrum used by the Aeronautical Radionavigation System. The Joint Tactical Information Distribution System uses this spectrum, and the military will have to modify the hardware to prevent interference. Who will pay for the modifications and fund the third frequency has not been established.

National standards. The TEA-21 legislation, like its predecessor ISTEA, continues to emphasize the development of a national architecture and standards for ITS. TEA-21 directs the US DOT to: "develop, implement and maintain" a national architecture and standards for ITS, using standards-setting organizations such as the Society of Automotive Engineers, Institute of Electrical and Electronic Engineers, and others.

More significantly, TEA-21 requires additional actions by DOT to identify critical standards, and then ties federal funding for ITS projects to adherence to those standards. The DOT is empowered to establish "provisional" standards if, by January 1, 2001, any such critical standards are not adopted and published by the appropriate standards development organizations.

ITS future benefits

Increased GPS accuracy and reliability will benefit the whole user community — which has already grown to unforeseen proportions. Today's more intentional planning will create opportunities for innovative products we have yet to imagine. Someday NDGPS on a chip will be embedded in our palm computers, cellphones and wristwatches. None will have an ITS label, yet their heritage can be traced to ITS legislation and research.

Russ Steele, a retired advanced strategic planner for an automotive electronics and aerospace company, is now a freelance writer following consumer acceptance of new technology.

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Visteon Automotive Systems, a subsidiary of Ford Motor, The American Rd., Dearborn, MI 48121; Tel: 313/322-3000

Ford, Lincoln Commitment Customer Assistance Center, 1-800-521-4140

General Motors, OnStar Communications Tel: 248/ 269-1334

Siemens Automotive Corp., 2400 Executive Hills Dr., Auburn Hills, MI 48326; Tel: 810/253-1000; Fax: 810/253-2998

Battelle Research Center, 505 King Avenue, Columbus, OH 43201-2693; Tel: 614/424-5189, Fax: 614/424-3260

The Strategis Group, Stephan Beckert, Tel:202/530-7500, Fax: 202/530-7550

LeafGuard Gutter Systems, 1-800-977-5323

Optoelectronics OptoCom Communications Receiver

A review by Haskell Moore

In 1994, computer-controlled scanning took a giant leap forward when Optoelectronics introduced the OptoScan456 computer interface for the Realistic PRO-2006 scanner. By adapting one of the best scanners ever made to computer control, the scanning hobbyist could at long last enjoy the features that had been limited to rather expensive radios. Offering ease of installation and relatively low price, the OS456 was an instant success.

A short time later, a similar computer interface was released for the then-new PRO-2035/2042. And now, Optoelectronics has taken computer-controlled scanning to the next level with the introduction of the OptoCom Communications Receiver.

The OptoCom was a collaboration between Optoelectronics and GRE. As you may recall, GRE was the manufacturer of the PRO-2006 and several other highly popular scanners marketed by Radio Shack. Optoelectronics started with a PRO-2042 receiver, removed the display, and put the package in a neat, black box. However, under the hood, the OptoCom has several innovative features not found on the original PRO-2042.

The most notable of these features is the internal "data slicer." Without getting into too much technical detail, the data slicer is a circuit which allows the radio to decode certain digital signals and translate them to data which can be sent to a personal computer via an RS-232 connection. The data signals which may be decoded include, but are not limited to, the control channels for Motorola Type I and Type II, Johnson LTR, and GE/Ericsson trunked systems.

For those of us who frequently monitor trunked systems, this used to require building our own 2-Level FSK interface (also known as the "Hamcom" interface). It also required modifying the scanner intended to drive the interface to obtain the discriminator audio. Discriminator audio is the clean, unfiltered audio signal before it gets conditioned for ease of listening (which also distorts it beyond use for digital interface purposes). However, the OptoCom's built-in data slicer makes the process considerably simpler and more efficient. Just hook the radio up directly to the computer and you're ready to go. The data slicer is already connected to the discriminator audio inside the radio.

The OptoCom also features a host of input/output connections which provides a wide range of functionality to the user. First, there are the basic connections and switches you'd expect on a high-end computer controlled scanner: BNC antenna connection, external speaker jack on the rear and headphone jack on the front, RS-232 serial connector, and a 10dB attenuator switch. But, in addition to these, there is a tape recorder controller, tape audio output jack, two CI-V connections and a discriminator audio jack. Between the hardware and software features, the OptoCom comes with just about every option you could need or want in a scanner.

Performance of the radio was generally very good, considering the test environment. I gave the radio a test run in my office in the center of downtown Houston. This is one of the most RF-rich environments in the nation, having literally hundreds of antennas within less than a mile radius. In this environment, the OptoCom performed very well, but with some intermod, predominately in the 450-470 MHz region. However, when the PL (Motorola's "Private Line" subaudible tone) decode function was enabled on the software, performance was rock solid with almost no intermod interference.

The OS456 allowed computer control of the Realistic PRO-2006. Now, multiple-system trunk following and conventional scanning is available in a little black box.

The OptoCom provides connections for almost any option one could want in a scanner.

Optoelectronics' chief engineer Bill Owen has indicated that there is an important upgrade in the works for the OptoCom. This new circuitry will be known as the "bit banger," and will enhance the ability of the OptoCom's data slicer to work with Windows-based software. Currently, all packages which utilize the data slicer are DOS based because of the timing issue between the serial port and the radio when running under Windows. The bit banger will offer the necessary translation and buffering to allow seamless communications between the hardware and software.

Street price on the OptoCom communications receiver is $459.95 from Optoelectronics (800) 327-5912, Grove Enterprises (800) 438-8155, and other *MT* advertisers. But what is a computer-controlled radio without the software to run it? There is a variety of software packages available for use with the OptoCom, and more slated for release in the near future. There is even a free program which will control the OptoCom with a Palm Pilot.

For this article, we'll take a brief look at five of the software products currently available for the OptoCom: the OptoCom utility

software, TrakkStar, TrunkTrac, Trunker, and E-TRAX.

OptoCom Control Software

The OptoCom Communications Receiver also includes a small DOS utility to essentially test and perform basic functions with the radio. You can tune into a single frequency and put the radio in standalone mode to monitor that frequency. You may also control the volume of the radio, the mode (AM, FM or FM-Wide), and activate a tape recorder though the tape jack control of the radio. The OptoCom software will display the relative strength of any received signal, the CTCSS/DCS (Continuous Tone Controlled Squelch System/Digital Coded Squelch) or LTR (Logic Trunked Radio) codes, and various statuses of the radio.

If there are frequencies already loaded in the radio's memory, the radio can be placed in the stand-alone mode, and it will begin scanning. If the OptoCom Control Software is connected to the radio, the frequency, signal strength, and CTCSS/DCS or LTR codes will be displayed on the computer, but no other control of the scanning function is available through this software.

OptoCom Control Software screen shot

TrakkStar

A copy of TrakkStar, a Windows-based package (3.1, Win95 or Win98) from Signal Intelligence, is included with the OptoCom. Signal Intelligence has provided software for the Optoelectronics radios and interface boards since the release of the OS-456 interface back in 1994.

TrakkStar is distributed on one floppy and has a copy protection scheme that requires the original diskette and serial number be used for installation. Installation is relatively straightforward, and the defaults in the software worked perfectly when used on three different test computers.

TrakkStar is a very versatile package, and can follow both conventional frequencies and trunked talkgroups in a single scanning session — something that no other computer-controlled scanning package can do. However, in order to accomplish this, TrakkStar does not use the trunking data channel information, but instead, the sub-audible information which is actually embedded along with the audio on the voice channel.

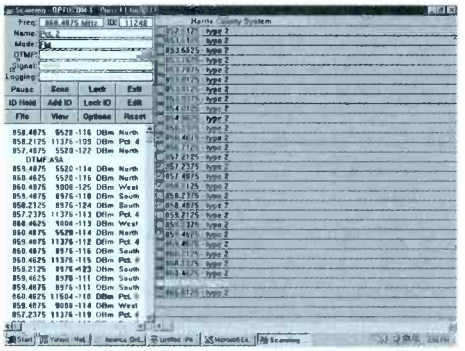
This method works relatively well, except on large, busy trunked systems. Then, because the software has to take time to decode the sub-audible for every signal it encounters, it sometimes misses part or all of the transmission when following selected talkgroups. Another problem encountered is when a trunked system uses both even and odd talkgroups. When TrakkStar attempts to decode the sub-audible, it may confuse an even numbered talkgroup with a consecutive odd-numbered talkgroup. This is a relatively rare situation which I've not encountered personally, but it does occur on some systems.

There are four different displays available with TrakkStar. The always-on-top **Standard** display can be moved to one side of the screen, and can keep you up to date on the channel name, frequency, signal level, and other key information, currently active on the scanner. The full screen **Tactical** display shows agencies or frequencies selected to be monitored, history list of most recent channels received, and a wealth of other information. The **Mini-Status** window is a small, inconspicuous bar that shows only the most critical of information, and can easily be tucked out of the way when scanning is a lessor priority function. And finally, when TrakkStar is minimized, the active frequency and channel name is shown on the icon.

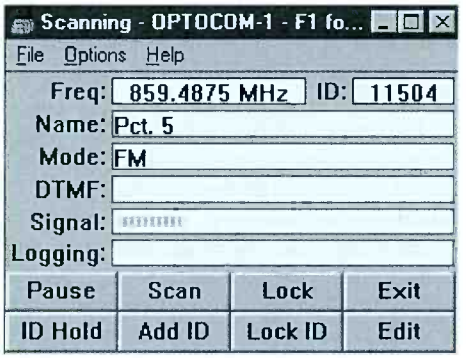
During scanning with TrakkStar, it is easy to lock out either individual nuisance channels, or even entire banks of channels. You can also put a channel on hold if you happen across some interesting activity. Signal level is also displayed, as are any DTMF (Dual Tone Multi Frequency) digits received in the transmission.

The TrakkStar program also allows search banks to be created, which allow the user to find new frequencies by searching between frequency boundaries. The searches may be allowed to run in an unattended mode for days on end, and a log will be built of all activity during the search. Finally, several scan and search files may be created and executed in series during a session. The percentage of time dedicated to each task may be specified to allow even greater control over the scanning session.

The Data Manager program included in the TrakkStar package has extensive features which make entry and management of stored frequencies comparatively easy. It offers excellent import/export utilities with four data format options. Since the scanning software is not limited to the number of banks and channels of the radio, an almost unlimited number of virtual banks and channels may be

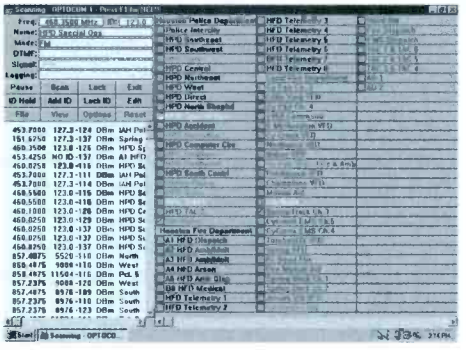


TrakkStar "Tactical" display monitoring a large Motorola trunked system



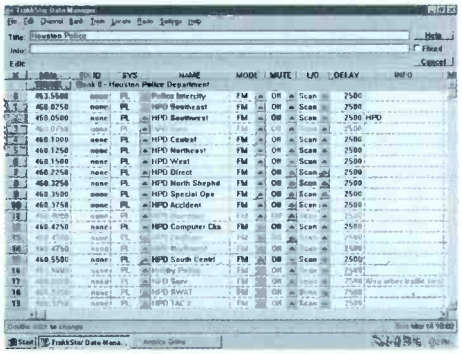
TrakkStar "Standard" display showing reception of a trunked talkgroup

TrakkStar "Mini Status" window showing reception of a conventional frequency



TrakkStar "Tactical" display monitoring several banks of conventional frequencies

TrakkStar "Iconized" display monitoring a conventional frequency



TrakkStar Data Manager window for editing conventional frequencies

created, sorted and rearranged with the Data Manager.

Additionally, the Data Manager tracks the number of "hits" and elapsed airtime for each channel. And all of this information is available through a variety of report formats. The Data Manager is a very flexible and useful part of the TrakkStar package, and contains many beneficial features for the management and reporting of frequency and channel information.

The OptoCom also has limited functionality in a stand-alone mode. Using TrakkStar, up to one thousand frequencies may be loaded into the radio's memory. You may then disconnect the radio from the computer and listen to these frequencies or to one specific trunked talkgroup. However, since the OptoCom has no display or controls (except volume and squelch), the major limitations in this mode are the inability to either see the frequency being received or control the scanning functions.

You can, however, interface the radio to the Optoelectronics Scout, and use it to "Reaction Tune" the radio to any frequency intercepted by the Scout.

In summary, TrakkStar is an excellent, feature-rich product which has evolved over the past five years to a mature, robust package. This package allows monitoring of conventional frequencies, as well as Motorola and LTR trunked systems (but not EDACS). It is an excellent complement to the OptoCom, and brings out the best of the radio's features.

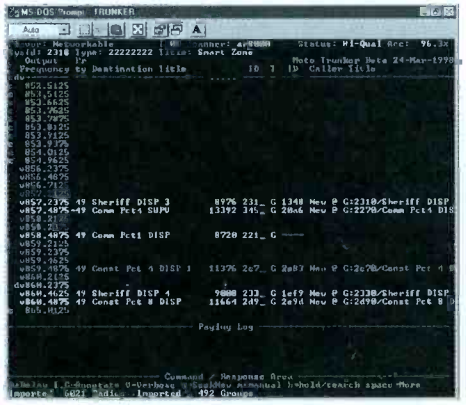
TrakkStar is included in the purchase price with the OptoCom Communications Receiver. You can learn more about TrakkStar, and its companion products, at **www.scanstar.com**.

Trunker

Trunker is everything I love in a program; it's a small DOS-based executable, works great, runs on just about any PC, and it's free! It is by far one of the most useful programs I've used with the OptoCom. Trunker has an almost cult-like following. There's a multitude of postings on the Internet regarding its setup, usage, and even schematics for interfacing the program to various radios.

Trunker has two modes of operation. First, it can be used as a simple Motorola Type I, II or Hybrid system monitor. Just tune the radio to a control channel, start up Trunker, and it automatically lists all the active frequencies and talkgroups in use.

When using Trunker with any radio other than the OptoCom, it's necessary to build an external data slicer circuit to interface the scanner's discriminator audio to the computer. However, with the OptoCom, the built-in data slicer allows a direct connection via the RS-232 from the radio, straight into the computer. Also, of all the data slicers I've built, the one in the OptoCom gives as good or better performance than any of them. For example, on my most frequently monitored local system, Trunker's accuracy percentage usually hovers around 95% to 99.8%.



Trunker monitoring the busy Harris County, Texas system

Trunker screen shot from Lindsay Blanton's Web page

Trunker's ability to log the frequencies for a given control channel is enough to make it an indispensable tool to any scanner enthusiasts. But in addition, you can then tag each talkgroup and even individual radios on a Type II system. It's also possible to color code the various talkgroups for ease of identification. Once you've taken the time to load all the talkgroups in, you can tell at a glance which talkgroups are active on the entire system at a given moment. You can even quickly spot when new talkgroups become active, since they show up with a question mark in place of the talkgroup info.

Finally, if you have a second computer-controlled radio, such as another OptoCom, an AOR 8000, an Icom with a CI-V interface, or a PRO-2006 or PRO-2035/2042 with an Optoelectronics interface, you can use Trunker to automatically follow the conversations on a Motorola system. You can also set the priority on each talkgroup, and lock out those you'd like to skip.

The only downfall to this monitoring scheme is that it always operates in what is analogous to a scanner's "search" mode. To scan a specific set of talkgroups, you have to manually set the priority of all other talkgroups to "50" or greater, then let Trunker go to whichever talkgroup becomes active that is below the "50" threshold.

Trunker may be downloaded from Lindsay Blanton's excellent Web page at **http://web2.airmail.net/lblant1/dfw/digital.htm**. There is also a wealth of interesting and useful information on this page regarding other digital monitoring software.

TrunkTrac

If the name "TrunkTrac" sounds extremely close to "TrunkTracker," it's no coincidence. The technology developed by Greg Knox for this program was later licensed to Uniden and became the basis for the highly successful TrunkTracker series of trunking scanners.

TrunkTrac is the only program evaluated which required a separate piece of hardware. This hardware is in the form of an ISA PC card used to decipher the control channel information. A separate cable connects the card in the computer to the discriminator output from the OptoCom and control of the OptoCom is accomplished via the RS-232 connection to the radio.

OPTOCOM TRUNK-TRACKING, COMPUTER-CONTROLLED SCANNER!

This new triple-conversion OptoCom scans at 65 channels per second on any frequency range, 25-550 and 760-1300 MHz (less cellular), in AM and wide or narrow FM, using any laptop or tabletop PC. Now you can monitor conventional communications as well as track civilian and government Motorola, GE/Ericsson (EDACS)*, and LTR (Johnson) trunking. Scan Star's exclusive TrakkStar software operates under Windows 3.1, 3.11, or 95.

Memory capacity is limited only by your computer. Up to 28 channels, or one trunk user group ID, may be stored in the OptoCom for stand-alone mobile or portable use away from the host computer! And you can use your Opto Scout to Reaction Tune the OptoCom as well!

Computer Not Included

Bonus Features!

You can decode five-tone squelch, CTCSS, DCS, LTR, DTMF, and Motorola talk group IDs. RS232C interface included, and you can interface with CI-V receivers like the Icom and AOR using pass-through technology. Remote-control the squelch, volume and all other receiver functions. Use its internal speaker, or feed up to 1.8 watts to an external speaker (headphone and tape out jacks provided).

Power required: 12 VDC (AC adaptor included). Computer required: 486 or higher, minimum 66 MHz, with 16 megs RAM.

Order SCN3, only $459.95
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optional E-TRAX software required to receive GE/Ericsson (EDACS)..... Order SFT-4 / $49.95

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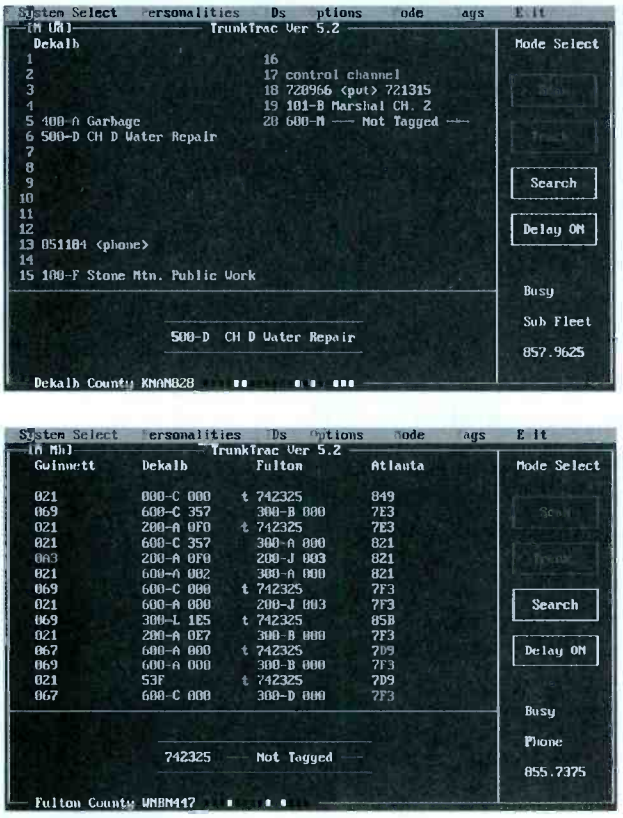
Unlike some trunk tracking programs which requires two scanners to monitor trunked conversations, TrunkTrac can accomplish this with just one. The TrunkTrac software mimics the operation of a conventional trunked radio by dwelling on the control channel until a talkgroup becomes active, then switching to that frequency for the duration of the conversation. When the talkgroup becomes inactive, the radio is switched back to the control channel until another talkgroup is detected. TrunkTrac also offers the ability to track multiple trunked systems in a single scanning session.

Installation of the TrunkTrac card is simple and straightforward. Just plug the card into any open ISA slot, plug the supplied discriminator audio interface cable to the scanner, connect the serial cable, and you're ready to go.

Software installation is also relatively uncomplicated. The DOS-based program is only 250K in size, and comes with a clear, concise printed manual. Like the TrunkTracker scanner, it is necessary to load the frequencies into TrunkTrac manually. Name assignments and color selection for the various talkgroups may then be entered, or you may simply choose to let the program run in the search mode.

When running TrunkTrac, the user can designate specific talkgroups to monitor (analogous to scanning), or can jump to the next talkgroup that becomes active on the control channel (analogous to searching). Certain talkgroups can also be excluded from the search by entering them into the lockout list.

TrunkTrac allows the user to change most of the many of the parameters on the fly. The channel format, talkgroup format, and various other displays may be changed at the touch of a key. Additionally, you can switch between search and scan mode with just a function key. You may also hold on a talkgroup (referred to as the "track mode") or skip a talkgroup that is active with a keystroke. You can even add talkgroups to either the scan list or lockout list without ever exiting the main scanning program.



TrunkTrac tracking a single system (top), and four systems at once (above). Courtesy: Greg Knox

TrunkTrac requires a minimum 6 MHz PC and runs under MS-DOS, or in DOS mode under Windows. TrunkTrac is designed for scanning only Motorola trunked systems, and will not support scanning of non-trunked frequencies. This package is available exclusively from Scanner Master Corporation at (800) 722-6701. You can read more about TrunkTrac at **www.scannermaster.com**.

TrunkTrac hardware, software and cable

E-TRAX

With the OptoCom, it is possible to follow the conversations on a GE/Ericsson trunked systems using the E-TRAX software package. E-TRAX is also a DOS product, and is rather straightforward and simple in its operation. However, before beginning, you *must* know the trunk's control channel frequency, plus all frequencies used in the system in the sequential order in which they are accessed. Failure to enter this information correctly will result in E-TRAX not functioning correctly. Fortunately, much of this frequency information can now be obtained over the Internet. To make it a bit easier to get started, several system files for the United States and Canada are included on the distribution diskette.

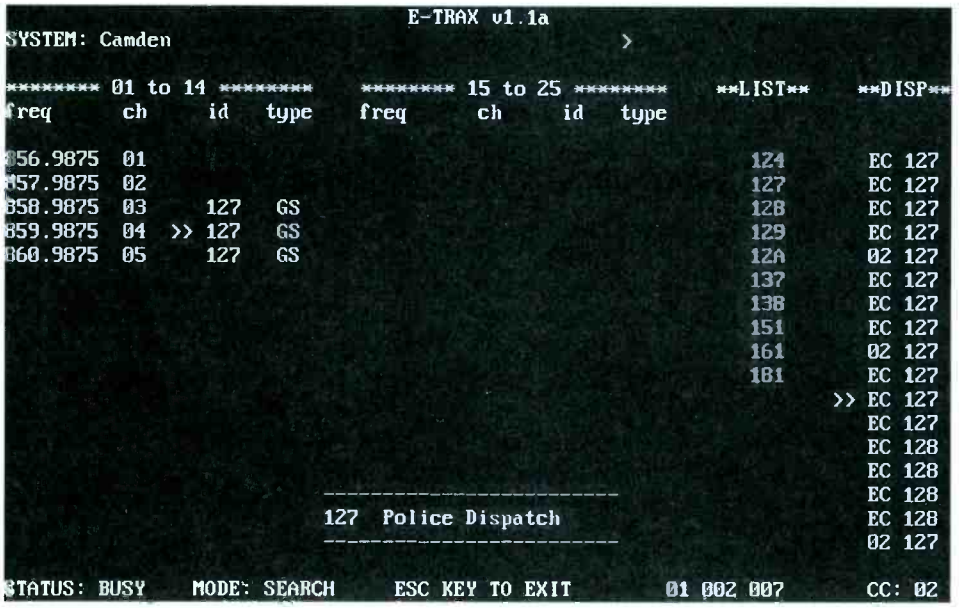
E-TRAX requires no additional hardware or interface cable, other than the RS-232 serial cable from the computer to the OptoCom. To begin, you must modify or confirm the parameters in the configuration file. Next, you must create a file for each trunked system to be monitored. This is where the frequencies must be entered, along with the specific group IDs for up to 1,000 group IDs. You may also specify lockouts for nuisance or unwanted group IDs.

When E-TRAX is initiated, it automatically locates the control channel and begins tracking conversations on the system. The E-TRAX display indicates the frequencies, channel assignments, ID and type, which are shown in a columnar format. Active group IDs are displayed at the bottom of the screen, along with the alpha tag information. E-TRAX is compatible with 9600 baud EDACS systems, and allows you to either scan known group IDs, or search the system for unknown IDs. It should also be noted that E-TRAX is designed exclusively for scanning EDACS systems, and will not support any other trunked system or non-trunked scanning.

E-TRAX requires a minimum 486/66 computer and runs under MS-DOS. It is available for $89.95 from Grove Enterprises at (800) 438-8155, Optoelectronics, Inc at (800) 327-5912, and other *MT* advertisers. You can find out more about E-TRAX at **http://www.erols.com/jcardani/e-trax.htm**.

A FINAL WORD REGARDING COMPUTER-CONTROLLED SCANNING

Computer-controlled scanning has added a whole new dimension to the scanning hobby. With the right software, it enables the scanner to search large ranges of frequencies for new and exciting action. You can even monitor Motorola, LTR or EDACS trunked systems. For a computer-controlled scanner, software is as integral a piece of the total scanning package as the hardware. However,



E-TRAX screen shot

there are a few things to consider before pulling out the checkbook.

First, due to timing problems associated with serial communications when running under Windows, all of the DOS-based programs above (that is, all programs except TrakkStar) usually require you to restart your PC under the native DOS mode to ensure they will function correctly. This means that while your computer is running the scanner, that's all it can do.

Also, some of the trunking programs require that you have all of the frequencies for that system available before beginning. And though, thanks to the Internet, these are becoming more readily available, it can be particularly frustrating locating some of these frequencies. And like most software, each program has its own set of quirks and nuances that take a bit of getting used to.

Personally, I have found the effort to be more than worthwhile. For me, the added functionality available through computer-controlled scanning has been worth every minute of frustration it has taken to get even the most cantankerous of programs to run. Even as I write this, I am scanning a range of frequencies from a database and have found lots of interesting new activity I've never heard before. However, to avoid frustration and disappointment, you should research the software carefully before buying. Check for postings on the Internet, including Web pages and newsgroups. Then when you make an informed purchase, you will have a good idea of what to expect before you ever open the package.

Richard Barnett
ScanMaster@aol.com

Scanner Marketing: You tell us

The earliest scanners, developed in the late 1960's, became an almost overnight success due to one very significant piece of luck: good timing. The country was in turmoil, political leaders were the targets of assassins, the county was embroiled in the Vietnam War, and race riots were burning up the urban landscape. People found sanctuary in their homes, but they lacked timely information about what was going on around them. The scanner was the answer.

With their new-fangled police monitoring device, citizens could stay abreast of what was really happening. A few years earlier — before Bearcat, Regency and others developed their products — people were able to listen to police and fire calls using tunable receivers. That was cumbersome and only allowed you to listen to one agency at a time. The scanner changed all that.

Thirty years later, there's been quite a turnaround in our nation. Crime is down, the country is not at war, and just about the most civil unrest you'll find is when the local toy store runs out of beanie babies. On top of that, we're now inundated with information, from tabloid television news to the Internet. We're much more attuned to what's going on around us.

Scanners, however, still sell — and sell well, although not in the numbers they did 10 years ago. We've been through the reasons before: the number of dealers has declined (there are few remaining mom-and-pop CB/scanner stores for example), people have become fascinated with the Internet or another of a myriad of new distractions. While there will always be a ready market for scanners amongst the public safety, military, auto-racing and scanner-buff contingents, the question remains whether or not there is still an untapped market for our beloved product.

The success of scanner manufacturers, scanner book publishers, accessory makers and others within the industry may depend on finding this new market for their products. So, we thought we would turn to the faithful scanner elite for answers. Let's begin a discussion here that might help the industry leaders sell more units and therefore, invest more heavily on the business. Send letters, care of Rich Barnett, to *Monitoring Times* magazine, or send e-mail to *scanmaster@aol.com*. Tell us:

1.) What new group of users, or type of person, would be most inclined to buy a scanner if they haven't already?
2.) What types of features or designs would encourage them to buy such a scanner? Does it have to be small, does it have to include shortwave coverage, the TV audio band or a TV itself?
3.) Does the scanner have to be more user-friendly? How so? How can the basic scanner be made even easier to use?
4.) How do you currently interest family and friends in scanning?
5.) How would you go about telling the general public about scanners?

We've discussed before what features you would like to see on a scanner. We heard about your desire for alpha displays, Ericsson trunktracking, LTR tracking, CTCSS/DCS, and the like. Now we would like to know your thoughts on how we can bring new people, and new groups of people, into the fold. We hope to hear from you soon.

Disaster Monitoring in Canada

There have been numerous books and articles on the topic of disaster monitoring. The question has been asked and answered time after time, "what agencies, and what frequencies, should you monitor during a local disaster?"

Fortunately, most of us never have the chance to monitor a true disaster. David George of Nova Scotia did have that chance when a Swiss Air flight went down off the coast of Canada, September 2, 1998. Here's his report which was filed only a few weeks after the tragedy:

"The crash site off of Peggy's Cove, Nova Scotia, was too distant for the Halifax Regional Municipalities 800 MHz SmartZone IIi system to reach. This area is also outside of the Municipalities' police jurisdiction and is in Royal Canadian Mounted Police (RCMP) territory.

The humble cell phone was the main communications link. When the media arrived it was hard to get an outside line, so cell service providers MT&T and Cantel set up portable cell sites on location in the parking lot in front of the light house that is the mark of Peggy's Cove. It was interesting to note that Cantel, which has rather poor coverage in Nova Scotia, brought in a ready-to-go cell site with pop-up tower, while our own telephone company MT&T had to jury-rig something using an antenna mounted to a boom crane truck.

The first call for EMS help came at around 10:30 p.m. Thirty-five ambulances responded from all over Nova Scotia with seventeen fire trucks. When it was discovered that there were no survivors, the ambulances were sent back."

Communications were in these ranges:

Ambulances
158.940 Health services repeater
Royal Canadian Mounted Police (RCMP)
155.640 Tantallon repeater
155.670 Ground search and rescue operations
Marine
156.940 Channel 19 - Salvage and recovery
Fire
153 - 155 Volunteer fire departments
Emergency Medical Operations
148.565 Hammonds Plains repeater - Red Cross

142.875	Simplex - Ground search and rescue operations
Ham	
147.270	VE1PSR - Emergency operations centers
146.550	Simplex - Logistics
146.685	VE1PKT - Ground search and rescue operations

"While there, MT&T put hardline phone cables into all the remote emergency operations centers, ground search and rescue command buses, and military sites. Even with the remote cell sites set up, only one in three calls were going through at the peak of the operation.

Ham radio played a key roll in providing most of the radio traffic in and out of the area. We were able to provide trained radio operators used to passing this type of traffic, as we have been training for this for well over a year now. Amateur radio had been written into the communications plan for Halifax Regional Municipality three years ago. It worked and things flowed smoothly."

The salvage operation continued for several weeks. The wreckage appeared on beaches from Martinique to the Ovens Park — a distance of almost 75 miles up and down the coast. It was the job of the 30 volunteer ground search and rescue teams in Nova Scotia to track down and recover these remains. The teams used the two Provincial Ground Search and Rescue radio frequencies of 142.575 MHz and 142.875 MHz for tactical communications. However, because of the limited range of the rubber duck antennas on the commercial handhelds, each team was given a cell phone to use as well. This proved to be the only workable solution in many areas of the crash zone.

David George added, "I am very proud of the rescue service providers and of the people of Nova Scotia for coming to the aid of those in need at this time."

Trunking News and Notes

Jon Van Allen of Utah wrote us with the following information for his state:

"Orem City is on the Utah County system. There is currently only one other user on the system besides Orem City PD, but Provo is reportedly close to being ready to move on the system. Here's what I have so far — there are currently 10 frequencies in use for call sign WPLP584, listed as Lehi, Utah, in the FCC database.

"There are an additional eight frequencies licensed with the same call sign, listed at Spanish Fork. I have not heard anything on the other eight frequencies; I think they are reserved for future use to tie the system together. Either that, or they are too far away for me to hear. Lehi is at the north end of Utah County, Spanish Fork is on the south end, over 60 miles south of me."

Motorola Type II Smartnet System Licensed to Utah County

Lehi Frequencies confirmed in use by Jon Van Allen:
1) 866.2250
2) 866.6250
3) 866.8375
4) 867.0875
5) 867.2875
6) 867.5750
7) 867.7250
8) 867.8875
9) 868.2875 (currently the data channel)
10) 868.6250

Talkgroup IDs:
16 - Link to UHP Statewide
4816 - PD Dispatch
4848 - PD Ch.2
4880 - PD Ch.3
4944 - Fire linked to 154.145

5648 Unknown user - seldom heard - sounds like maintenance of some sort.

The additional eight frequencies licensed to **Utah County, Spanish Fork,** not yet heard:
1) 866.4250
2) 866.4500
3) 866.8875
4) 867.2375
5) 867.4875
6) 867.9375
7) 868.6125
8) 868.9000

Pennsylvania 65000 (Talkgroups, that is)

One of the newer trunking systems in the nation can be found in Montgomery County, Pennsylvania. The following is a detailed analysis of their system:

Montgomery County, PA, 800 MHz Trunked System

T.T. ID	Group
Police	
1616*	County Police North Central Dispatch
1648*	County Police South Central Dispatch
1680*	County Police South West Dispatch
1712*	County Police North West Dispatch
1744*	County Police Data
1776	Secure Communication Between Dispatch Units
1808*	Police Region 1 (car to car) <61,63>
1840*	Police Region 2 (car to car)
1872*	Police Region 3 (car to car)
1904*	Police Region 4 (car to car)
1936*	Police Region 5 (car to car) <33,31>
1968	Police Tac 1 (active when needed)
2000	Police Tac 2 (active when needed)
2032	Police Tac 3 (active when needed)
2064	Police Tac 4 (active when needed)
2096	Police Tac 5 (active when needed)
2128*	County Wide Police
2160*	County Detectives (13 cars)
2192	County Detectives Secure
2224*	County Sheriff (19 cars)
2256	Abington Township Police
2288*	Cheltenham Township Police (26 cars)
2320*	Upper Dublin Township Police (41 cars)
2352	Lower Gwynedd Township Police
2384*	Hatboro Borough Police (37 cars)
2416*	Horsham Township Police (39 cars)
2448*	Lansdale Area Police (dispatch on 1616)
2480	Lower Merion Township Police
2512	Upper Merion Township Police
2544	Lower Moreland Township Police****
2576	Upper Moreland Township Police
2608	Montgomery Township Police

2640*	Norristown Borough Police (link from 501.1125 MHz)**
2672	Plymouth Township Police
2704*	Pottstown Borough Police (94 cars)***
2736*	Lower Providence Township Police (100 series #s)
2768*	Springfield Township Police (28 cars)
2800	West Norriton Township Police
2832	Whitemarsh Township Police
2864*	Whitpain Township Police (46 cars, dispatch on 1648)
2896	Local Municipal Detectives
2928	Mont. Co. Correctional Facility

Fire and EMS

2992	Fire Dispatch
3024	Fire 1
3056	Fire 2
3088	Fire 3
3120	Fire 4
3152	Fire Ground 1
3184	Fire Ground 2
3216	Fire Ground 3
3248	Fire Ground 4
3280*	EMS Dispatch (linked to 46.0400 MHz, testing)
3312*	EMS 1 (linked to 45.9200 MHz, testing)
3344	EMS 2
3376	EMS 3
3408	EMS 4
3440	EMS County Wide 1
3472	EMS County Wide 2
3456	EMS County Wide 3
3536	EMS County Wide 4

Miscellaneous

3568	Public Safety Coordination
3600*	Public Safety Department Management (1500 units)
3632*	Court House Security (23 cars)
3664	County Communications (1500 units)
3696	LGS Coordination
3728	North Wales Water Authority
3760*	Montgomery County Parks (500 units)
3792	County Public Works
3824*	County Wide Emergency Traffic 1
3856	County Wide Emergency Traffic 2
3888	County Wide Emergency Traffic 3
3920	County Wide Emergency Traffic 4
3952	County Wide Emergency Traffic 5

Notes:

* Known to be an active talk group.

** Norristown Borough Police ID as 52-100 to 52-900 series #'s 100=Administration, 200,300,400&500 = Patrol by shift.

*** Pottstown Police also dispatches North Coventry Township, Chester County's Police on their talk group, they ID as 17 cars.

**** When (and if) Lower Moreland Township Police switch to 800 MHz, they will continue to dispatch Bryn Athyn Borough Police (27 cars) on their talkgroup.

Trunked Radio System Frequencies:
CH1=868.7625
CH2=867.375
CH3=867.2625
CH4=867.1375
CH5=866.8875
CH6=866.6375
CH7=866.2625
CH8=856.7375
CH9=855.9375
CH10=Blank
CH11=854.9625
CH12=851.3625

Conventional Frequencies:
Local 1=866.0375 (County Wide Local, PL=136.5)
Local 2=866.4125
Local 3=867.6500
Local 4=867.7625
Local 5=868.7125 (Parks Local, PL=136.5)

National Law Enforcement Frequencies:
Hailing=866.0125
1=866.5125
2=867.0125
3=867.5125 (Montgomery Co. Primary)
4=868.0125 PL=156.7

California Trunking

With the OptoCom and the forthcoming introduction of the BC-245 TrunkTracker II, we thought it would be interesting to report the following press release, distributed a year ago by Ericsson. This new system implementation should, by now, be well under way. It sounds as if the East Bay in northern California will become almost entirely EDACS territory.

"Citing Ericsson's strength and strong record in the Bay Area, the city of Richmond, California, has selected the company to provide its digital access trunked radio system for all its city agencies' communications needs, in a contract totaling $8.3 million.

"Richmond will receive a five channel, four site GPS simulcast system with six C3 Maestro Consoles for Windows NT. They will utilize approximately 610 LPE 200 portable radios and 400 Orion mobiles. The contract will cover Richmond's police, fire and public works departments, as well as its Housing Authority.

"The city of Richmond is located in Contra Costa County, 6 miles northeast of San Francisco and 12 miles north of Oakland. BART (Bay Area Rapid Transit Authority) and the city of Oakland are both users of Ericsson's trunked radio systems and played a key role in Richmond's selection of the company.

"'As part of our research, we visited Oakland, toured their facilities and listened to their experiences with Ericsson and things they liked about the company,' said Levron Bryant, interim city manager for Richmond. 'We also were impressed with Ericsson's presence in other parts of the Bay Area, as well.'

"Richmond will allow other neighboring jurisdictions to utilize its network, including the cities of El Cerrito, Kensington, Hercules, Pinole and San Pablo. The city also will be using encryption technology for various departments within its police force, such as Narcotics. Richmond is planning to link its system to the city of Oakland's as part of the East Bay Public Safety Corridor Initiative, which is seeking to interconnect cities' communications networks along Interstates 80 and 880 in the Bay region.

"'We hope that linking our system to Oakland's will create a seamless line of communications between our cities during emergency situations,' Bryant said. According to Bryant, both the police and fire departments will be implementing mobile data on a separate, two-site Ericsson conventional system. Police will use it for vehicle identification, background checks and outstanding warrant searches. The fire department will utilize data for GIS (Geotechnical Information System), which will project a map of the city on the mobile data terminal to help direct fire personnel to the scene quicker."

Editor's Note: It has also been reported that the city of San Francisco, which has long been in need of a new radio system (they have used an odd mix of UHF and low-band for years), has selected Motorola for a new APCO-25 digital radio system. We'll keep our eyes and ears tuned to this situation.

And a final observation for this month: Did you catch the History Channel special about the St. Valentines Day Massacre? It was reported that Al Capone's personal car was equipped with a police radio receiver. Something tells me, though, that it was the police who supplied the receiver in that instance.

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The Bearcat 895XLT is superb for intercepting trunked communications transmissions (see BC235XLT description below) with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include ***Auto Store*** – Automatically stores all active frequencies within the specified bank(s). ***Auto Recording*** – This feature lets you record channel activity from the scanner onto a tape recorder. ***CTCSS Tone Board*** (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle's fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Order from CEI today. Call 1-800-USA-SCAN.

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Trunk Lockout • Trunk Delay• Extra battery & charger
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Frequency Coverage:
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Bearcat 895XLT-A 300 ch.TrunkTracker base scanner	$319.95
Bearcat 760XLT-A 100 channel base/mobile scanner	$179.95
Bearcat 235XLT-A 300 channel TrunkTracker scanner	$269.95
Sportcat 150-A 100 channel handheld with 800 MHz.	$144.95
Bearcat 148XLT-A 20 channel weather alert base scanner	$79.95
Bearcat 80XLT-A2 50 channel handheld scanner	$109.95
Bearcat 60XLT-A 30 channel handheld scanner	$79.95
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Bearcat BCT7-A information mobile scanner	$149.95
ICOM PCR1000-A computer communications scanner	$474.95
ICOM R10 handheld wideband communications receiver	$399.95
RELM RMV60B 60 Watt 45 channel VHF transceiver	$549.95
RELM SMV4099 45 Watt 99 channel VHF transceiver	$349.95

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Monitor the Y2k Countdown

The Millennium has already arrived.

In February of 1999, the United States Navy ships *USS Kinkaid* and *USS Ingraham* set ahead the clocks in most of their computer systems, letting them pass over into the dreaded year 2000. As everyone must be tired of hearing by now, this is the "Y2k" of computer jargon, when civilization itself is supposed to vaporize in a sickening cloud of bogus data, especially if we don't buy all the survival tools advertised by many of the doom prophets.

On March first, listeners to shortwave utility frequencies were treated to a real insight into the military's Y2k preparations. One US Navy carrier group, a US amphibious group, one Canadian ship and one US Coast Guard cutter all put out to the Pacific, set up all the usual tracking and communication circuits, and let everything change centuries all at once, while computer technicians watched and talked on the radio.

Nothing happened. The system is said to have hesitated for a brief instant, after which everything happily set itself to a date described as "1/1/0." The human race survived.

These clocks are back on real time, but many more tests are to come. Every ship in the Navy may hold its own Y2k drill. At some point in late June, the entire US Department of Defense (DoD), along with many other federal agencies, plans an "end-to-end test," in which everything from weather instruments to nuclear warning systems is set forward and rolled over. The military also plans a series of "Positive Response" drills (Joint Chiefs' lexicon for a type of command post exercise), lasting into September.

Meanwhile, Canada has made Y2k testing its main defense priority for the year. NATO, the North Atlantic Treaty Organization alliance, will surely incorporate such tests into its regular interoperability drills held several times a year. The UK, Australia, and New Zealand have exercises planned. May and June seem to be the peak months for all this, leaving half the year to fix whatever problems come up.

Y2k = Good Utility Listening

The supposed "Y2k bug" is no single, apocalyptic, computer failure, but more a series of weird mistakes that can occur any time between now and 2035. Early programmers figured, erroneously, that someone would fix or replace their wretched code when the machines got more memory. Nobody did, and now 1999 is one huge validation test.

Since one of the contingencies is the loss of our slick new communication modes, there's suddenly an interest in plain, old, "obsolete" HF (High Frequency, 3-30 megahertz). One example is the huge trial that the United States National Guard is planning for May first and second. This COMEX/MOBEX, for "Communication/ Mobilization Exercise," will be the first attempt since 1940 to contact all 480,000 Guard members at once. This time, however, they can't use the telephone. Nor can they use broadcast news. This leaves house-to-house personal contact, field radios, and HF.

Few hard facts on COMEX/MOBEX can penetrate the dense rumor fog surrounding the test. We do know that the country will be divided into regions, and mobile HF gear will be assigned to each one. Disaster scenarios will probably be used. The Guard members, however, will not actually have to report anywhere. They'll just note when and if they ever got their orders properly. Whether or not there's any extraordinary radio traffic, this unprecedented test will be great fun to follow.

FEMA Gears Up

Many, many other agencies plan Y2k simulations for spring of 1999. FEMA, the Federal Emergency Management Agency, plans several. These culminate in June with a national test, presumably complementing the "end-to-end" trial, and presumably incorporating one of those doomsday scenarios that FEMA does so well. Again, rumors run wild and facts are few.

It's all speculation whether or not HF will figure here, but if it does, the net control frequencies of 5211 kilohertz (kHz) and 10493 kHz, both upper sideband (USB), should be hopping. This net holds regular drills anyway, and it's sure to light up at some point in the Y2k countdown, so these are good frequencies to keep in memory for the rest of this year.

In a similar spirit, the American Radio Relay League has instructed its amateur radio emergency coordinators to seek understandings with local authorities. U.S. hams have long had their own June exercise, the popular "Field Day," where portable, HF stations take to the woods under emergency power. This year, there was some talk of making Field Day even more realistic by incorporating the annual Simulated Emergency Test, but radio clubs have resisted any such disruption.

I have collected a few possible frequencies for Y2k drills. Well, gotta go now. I've software to test.

Some Possible Y2k Frequencies (kHz)

All USB unless noted

Army National Guard

2220	2258	2300	2360	2390
2566	2710	3175	3205	3261
3384	4001.5	4030	4035	4233
4250	4290	4365	4415	4520
4610	4640	4780	4840	4885
4898	5090	5235	5397	5850
6910	6988	6994	7360	7861
7932	8040	8060	8170	8180
8500	8565	10586	12000	12060
12090	12240	12255	12270	12355
13163	13524.5	13540	13555	13722
14653	14776	17460	19090	20906
22126				

Army TRADOC (Training & Doctrine Command)

6766	12168

FEMA

3341	4779	4780.5	5211	5302
5693	5821	6151	6806.5	6809
7348	9462	10194	10493	17519
20027	24526			

Military Affiliate Radio System (MARS)

3311	4041	4590	6826	
6997.5	7315.5	7382.5	7498.5	7540
13508	13910	13993	13997.5	
14383.5	14389	14390		

MARS frequencies below 10 MHz are often lower sideband (LSB)

National Telecommunications Alliance (NTA)

7552.1

State Emergency Capability Using Radio Effectively (SECURE)

5135	5140	5192	5195	7477
7480				

Shared Resources (SHARES)

4490	5236*	5711	6800	9106
11217	13242	14396.5*	15094	17487

*SHARES Coordination Net

US Navy

4372	4645.1	5732	5840	6242
6691	6815.6	7535	7741	
7893.5	8295	8971	8993	11187
18971				

(Some of these are US Coast Guard channels used in joint operations)

Utility Loggings

Hugh Stegman

Abbreviations used in this column

AAF	Army Airfield	HQ	Headquarters
AAFB	Air Force Base	LDOC	Long Distance Operational Control
ALE	Automatic Link Establishment	MFA	Ministry of Foreign Affairs
AM	Amplitude Modulation	M/V	Motor Vessel
ARIA	Advanced Range Instrumentation Aircraft	MWARA	Major World Air Route Area
ARQ	Automatic Repeat Request teleprinting scheme	Ops	Operations
ASCII	American Standard Code for Information Interchange	Packet	Computer networking and teleprinting scheme
CP	Command Post	Pol-ARQ	ARQ scheme used by Polish embassies
CW	Morse code telegraphy ("Continuous Wave")	RSA	Republic of South Africa
EAM	Emergency Action Message	RTTY	Radio Teletype
FACSFAC	Fleet Area Control and Surveillance Facility	SAM	Special Air Mission
FAPSI	Russian intelligence and communication agency	SECURE	State Emergency Capability Using Radio Effectively
FEC	Forward Error Correction teleprinting scheme	STS	Space Transportation System ("space shuttle")
FEMA	Federal Emergency Management Agency	UK	United Kingdom
FM	Frequency Modulation	Unid	Unidentified
		US	United States
		USS	United States Ship
		VIP	Very Important Person

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time).

702.0 Unid-North Korean female with numbers, using Radio Pyongyang transmitters, parallel on 621, 657, 720, 855, 3250, and 6400 kHz, at 1500. (Takashi Yamaguchi-Japan)

3016.0 Shanwick-Shannon/Prestwick Radio, UK, taking position report from Navy LD 10G, at 0515. (Ron Perron-MD)

3016.0 Air Force One-US Air Force with President aboard, working Shanwick and Gander enroute home from King Hussein's funeral, at 0208. (Jim Grey-ME)

3041.0 USS *Thomas S Gates*-US Navy, working Cape Radio in STS-88, at 0111. (Paul Bunyan-MO)

4030.0 ARIA Control-US Western Test Range, Vandenberg AFB, CA, telling ARIA 1 that a Delta launch is scrubbed, and he should return to base. Duplex with 6820, which was parallel with 8060, at 0952. (Jeff Jones-CA)

4372.0 7-Y-A, large US Navy net with Giant Killer (FACSFAC Virginia Capes) and many units with trigraph calls. Coast Guard and USS *Normandy* heard as well, began at 0156. (Roger C. Roth-WI)

4372.4 Xray-US Navy in Link-11 tracking net with 5-I-T, passing frequencies for exercise in Numerical Code NUCO/UNNUCO format, at 0307. (Perron-MD)

4426.0 NMN-US Coast Guard, Portsmouth, VA, with voice-synthesized offshore weather for waters south of Nantucket, at 0337. (Dean Burgess-MA)

4495.0 Surgical calling Nightwatch 01, the airborne CP, no joy, at 0541. (Jeff Haverlah-TX)

4635.6 TSIP-Unknown station, calling KBQP, lots of random-sounding letters in bad hand CW sending, at 0038. Again at 0042, with a better operator and 5-figure groups. Maybe the first guy was just practicing. (Thomas Roth-Germany)

4721.0 Reach 9023-US Air Force Air Mobility Command, patch via Andrews to Travis AFB, at 0236. (Jones-CA)

4724.0 Reach 401-US Air Force Air Mobility Command, with patch to Hilda East via Incirlik, reporting arrival time for Amman, Jordan, at 0305. (Perron-MD)

4724.0 Ascot 5578-Probable military transport, said he was above Denver, CO, made several "Mainsail" calls, no joy, at 0711. (Haverlah-TX) *[ASCOT is usually a UK Royal Air Force callword, but ??? - Hugh]*

4739.0 Red Claw 713-US Navy P-3 giving Spare Group report to 9-N-Q, at 0245. (Perron-MD)

5015.0 WUG-US Army Engineers, in weekly Monday Southern Region net on "Channel 2," parallel on channel 8 (9122.5), at 1511. (Bunyan-MO)

5140.0 Missouri State, in weekly Wednesday Operation SECURE net, at 1530, at 1530. (Bunyan-MO)

5565.0 Dakar-Dakar Radio, Senegal, in South Atlantic-2 MWARA net with KLM 793, at 0208 (Perron-MD)

5574.0 San Francisco Radio, patch from unid aircraft to dispatch at 0604. (Perron-MD)

5616.0 Gander-Gander Radio, Canada, in North Atlantic-B MWARA net with Delta 80 and Exxon 71 (US Air Force KC-135 tanker), at 0211. (Perron-MD)

5700.0 Abnormal 20-US Western Test Range, Wheeler AAF, HI, passing ARIA net frequencies, in same Delta countdown as on 4030 , at 0642. (Jones-CA)

5711.0 Moffett Rescue-US Air Force Aerospace Rescue & Recovery Command, also using callwords Mad Dog, in tactical exercise with airplane King 61 and helicopter Jolly 18, at 2020. (Jones-CA)

5715.0 North Korean numbers, powerful AM, at 1400. (Yamaguchi-Japan)

5717.0 *Mohawk*-US Coast Guard cutter, working Cape Radio for STS-88 launch, no interference to Vancouver Military who was also using frequency, at 2109. (Bunyan-MO)

5800.0 Nightwatch 01-US Air Force airborne CP, working WAR 46, ground station at Joint Alternate CP, moved to Z160 (6715 kHz) at 0015. (Haverlah-TX)

6151.0 Unid ALE burst heard here, could be FEMA, at 1550. (Bunyan-MO)

6215.0 North Korean numbers, in powerful AM, at 1400. Rare for them to

use this international maritime calling and distress channel. Maybe that's why she said, "Thank you" in Korean at the end. (Yamaguchi-Japan)

6321.0 SVU-Athens Radio, Greece, with CW marker at 0421. (Castillo-Panama)

6553.0 Air Guyana 715, told by unid ground station to give Royal Operations/Dispatch in Montreal a position report, at 0016. (Perron-MD)

6683.0 Nightwatch 01-US Air Force airborne command post, signal checks with Andrews at 0250. (Jones-CA)

6697.0 MKL-Royal Air Force, Kinloss, UK, in radio checks with J-4-W (Perron-MD)

6712.5 Charlie 03-Probable US military, working Mike 02, at 2157. (Haverlah-TX)

6730.0 Andrews-Andrews AFB, MD, calling VIP flight SAM 204, no joy, at 0125. (Jones-CA)

6761.0 SAM 375-US Air Force VIP flight, still on ground, getting working frequencies from control at Andrews AFB. Primary was F287 (11226 kHz), secondary was F451 (13248), at 0345. (Perron-MD)

6770.0 Cuban "Atencion" numbers station, 5-figure groups in AM at 0417. (Camillo Castillo-Panama)

6797.1 Cuban cut number station, 5-letter CW groups, parallel on 6982.1, at 1203. (Castillo-Panama)

6813.0 Cuban "Atencion" AM numbers, longer transmission than usual, went one full hour, starting at 1002. (Castillo-Panama)

6875.5 HYS214-General call in 300-baud packet, at 1847. (Jean-Marie Langlade-France)

6933.1 Cuban cut number station, 5-letter CW groups, at 1205. Same station, different day at 1237. (Castillo-Panama)

8026.0 Air Force 2-US Air Force carrying Vice-President, working Andrews VIP at 0409. (Jones-CA)

8040.0 SAM 204-US Air Force VIP flight, shutting down contact with Andrews VIP, at 0142. (Jones-CA)

8174.5 Whiskey-US Navy, working Mike-Kilo-Lima in LSB link-11 coordination net, at 1138. (J. Bessler-IN)

8186.2 Cuban "Atencion," AM numbers at 1137. (Castillo-Panama)

8240.0 P3AQ6-M/V *Cyprus Thalassini Tyhi*, a bulk carrier, calling Portishead Radio, UK, at 0219. (Perron-MD)

8776.0 Radcliff with EAM at 1916, 1945, and 2045. (Jones-CA)

8837.0 Unid air-ground traffic in Hebrew and English, probably El Al Airlines LDOC, at 2253. (Perron-MD)

8846.0 Titan 20, signal check with New York at 1845. (Roth-WI)

8971.0 Red Claw 71E-US Navy P-3, Jacksonville, FL, returning to base with engine #2 shut down, at 2123. (Perron-MD)

9016.0 WAR 46-US military Joint Alternate CP, in radio checks with Nightwatch 01 and WAR 46 Mobile, at 0656. (Haverlah-TX)

9025.0 Fuzzy 44-US Air Force, setting up refueling track for Wolf 1 and 2, escorting Royal Jordanian 001 home, at 1906. (Roth-WI)

9120.0 Nightwatch 01-US Air Force airborne CP, signal checks with Andrews at 2239. (Jones-CA)

10162.4 DOR-Bulgarian MFA, Sofia, with news in RTTY, at 1536. (Bob Hall-RSA)

10194.0 WGY 911-FEMA HQ, Washington, DC, working WGY 912, Special Facility, VA, on Foxtrot-25, also using ALE, at 1432. (Bunyan-MO)

10204.0 Black Car in lengthy satcom debugging with Nightwatch 01, asking if he should keep transmitting on 308.05 megahertz and receiving on 267.05. Long silence, then Nightwatch told Black Car to go secure, which he did, at 1702. (Haverlah-TX)

10780.0 King 65-US Air Force, telling Cape Radio, FL, to advise Coast Guard about pyro drop in "Crown drop zone;" at 0236. (Jones-CA) King 01-US Air Force, several patches to Braveheart Ops (Raymond 17, Moody) via Cape Radio, with tactical messages concerning helo Greyhound, an HH-60 in an extraction exercise so near the Cape that high power was causing feedback, at 1547. (Allan Stern-FL)

11059.0 SPAR 65-US Air Force VIP flight, signal check with Andrews at 1539. Hickam and Offutt with EAM at 1715. (Jones-CA)

11175.0 ADNG-US Army Vessel *Port Hudson*, LCU 2035, patch via Andrews, at 0100. (Perron-MD) Continental 751-Civilian airliner calling Albrook Global *[closed -Hugh]*. When Ascension answered, he asked the dumbfounded op for position relay to Mid-America air traffic control. Op said his net was for the military, but he'd try, at 0705. (Stern-FL) Fuzzy 44-US Air Force, with patch to Duluth CP via Andrews, setting up mission with Wolf 1 and 2, King Hussein's F-15 escort back to Jordan, then went to 9025 kHz at 1606. (Roth-WI) King 88-US Air Force HC-130, Moody AFB, with patch to King ops via Andy, while practicing drops over FL. Spelled callsign wrong at 2027. (Stern-FL)

11178.0 Falcon 01-Dutch Navy aircraft, with position report for PJK, Dutch Navy, Curacao, at 1210. (Perron-MD)

11214.0 Sentry 55-US Air Force, patch via Trenton Military to Raymond 24, relay to Falcon 01 that radar is down, plane is returning to Las Vegas, at 2233. (Jones-CA)

11220.0 Executive One Foxtrot-Hillary Clinton's plane enroute to Chicago, went to frequency F117, at 1953. SAM 202-US Air Force VIP flight inbound to Andrews with two Distinguished Visitors and ten other passengers, at 2122. (Jones-CA)

11264.0 Overture-US military, with several unsuccessful calls on what he called the "Charlie Hotel" frequency, a new one, at 1605. Also used US Navy "Charlie Alpha," 6691 kHz. (Haverlah-TX) *[Add Charlie Hotel to the lists. Nice work, Jeff. -Hugh]*

11453.6 IMB3-Rome Meteorological, Italy, RTTY weather codes, at 1757. (Hall-RSA)

11460.0 Andrews-Andrews AFB VIP, calling SAM 204 at 1647. (Jones-CA)

11466.0 SAM 206-US Air Force VIP flight, patch to SAM Command via Andrews, also using 8032 and 11460 kHz, at 2011. (Jones-CA)

13200.0 Roper 82-Texas Air National Guard C-130H, patch to Roper Ops via Andrews for arrival arrangements in Panama, at 2007. (Stern-FL)

13242.0 Dartboard, patch to Offutt Command Center via McClellan, could not set up secure comm and decided to wait, at 0215. (Jones-CA)

13257.0 Tusker 18-Canadian Forces C-130, Greenwood, patch via Trenton Military to Squadron Ops for 2117 arrival, at 1939. (Perron-MD)

13354.0 Titan 20 tanker in North Atlantic-E MWARA net with New York Radio, given 8846 kHz primary and 13330 secondary, at 1947. (Perron-MD)

13440.0 SAM 204-US Air Force VIP flight with Senator Bob Graham, advance work for Presidential visit to Honduras hurricane zones, at 1530. Trout 99, working Andrews at 2335. (Jones-CA)

13457 KIA 21-Federal Aviation Administration, OK, in weekly Wednesday Western Net, at 1730. (Bunyan-MO)

13542.0 ZRO3-Pretoria Meteorological, RSA, RTTY weather codes, at 1540. (Hall-RSA)

14486.0 RFGW-French MFA, Paris, with 5-letter coded messages to embassies in Fec-A, at 1658. (Hall-RSA)

14763.0 DOR-Bulgarian MFA, Sofia, with news in RTTY, at 1515. (Hall-RSA)

15475.0 Unid-Spanish 3/2 number groups in progress, good signal at 0117. (Gary Neal-TX) *[CIA "Counting Station," usually on 15478. -Hugh]*

16074.0 Unid-Polish MFA, idling Pol-ARQ at 1607. (Hall-RSA)

16077.0 WUJ-US Army Engineers, working WUG and using ALE, at 1636. (Bunyan-MO)

16260.0 P6Z-French MFA, Paris, calling L9C in Buenos Aires, Fec-A, at 1740. (Hall-RSA)

16351.4 Slovak station sending radiogram in ASCII, at 1309. (Langlade-France)

17240.1 IED21-Italian military, Rome, packet message from "COMSUP AVES," at 1028. (Langlade-France)

18018.0 Architect-Royal Air Force, UK, calling Hunter 02, at 2054 (Perron-MD)

18870.2 IED22-Italian military, Lebanon, packet connection with IED21 at 0838. (Langlade-France)

18971.0 Coast Guard 713-US Coast Guard, radio check with unid station, said he was "in the green" (secure comm), but was actually in distorted clear voice, at 2018. (Jones-CA)

19510.0 LGOS-French Embassy, Lagos, Nigeria, testing and then coded traffic for MFA Paris, in ARQ6-90, at 1556. (Hall-RSA)

20027.0 WGY 912-FEMA, VA, working WGY 9501, WA, on Foxtrot-58, at 1851. (Bunyan-MO)

20582.3 Unid-Military message in French, ARQ6-25, at 1700. (Langlade-France)

23265.0 McClellan-US Air Force, working Andrews at 1849. (Bunyan-MO)

24526.0 WGY 906-FEMA, TX, working WGY 912 on Foxtrot-70, at 1633. (Bunyan-MO)

24578.0 P6Z-French MFA, Paris, with coded ARQ6-90 traffic at 1602. (Hall-RSA)

25870.0 WFLA-Tampa, Florida, undelayed program of AM 970 kHz talk station, in FM, for cueing airborne traffic reporter per station engineer. (Ben Loveless-MI)

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Gearing up for Complex Decoding

Welcome to this month's column, Digital fans. Let's take a step back from the relatively simple signals we have been discussing over the last few months and consider what it will take to recognize and analyze signals that are a bit more complex.

Signals that would fall into the "complex" category would be multi-tone, multi-channel or multi-phase signals. Just in case you didn't notice, more and more of the older signals that have been around for years are slowly giving way to more modern equipment with complex wave forms. This makes the job of identification harder and decoding nearly impossible.

Certainly, a good quality radio and antenna should be one of the first acquisitions. I'm not saying every one needs a Watkins & Johnson HF 1000 with a 5 to 30 MHz HF log periodic aerial in the backyard, but one can dream! As with everything else in the hobby, the deciding factor will be money, so go with what you can afford.

A good rule to follow is that a top-of-the-line decoder will cost as much as a top-of-the-line radio. Remember, feeding a low quality signal into your expensive analysis rig makes for low quality analysis. Also strive to eliminate interference injection from as many sources as possible. Interference can show up as a strange component of a signal or even mask a narrow digital signal totally, so check carefully.

So what is available in today's decoder market? Quite a lot, as it turns out. Several great products are now available at affordable and nearly affordable prices to the hobbyist.

In the decoder/analyzer arena you will find that Wavecom and Hoka dominate the field. They offer a number of features you should look for in any decoder: auto signal identification, accurate baud rate measurement, a wide variety of modes decoded and identified, a variety of high quality tools for complex signal analysis, and a save feature.

Following Wavecom and Hoka is the older analog Universal equipment line of decoders which don't offer a number of the features mentioned above yet have a dedicated following. Also worth mentioning is Francois Guillet's RadioRAFT decoder — lots of capability at a low price.

Lets take a closer look at what Wavecom, Hoka and Universal are offering.

Wavecom

Wavecom has made great advances in their line of decoders in recent years and offers two PC card decoders, the W41PC (v4.2) and W40PC, that work under Win95/98/NT and two standalone decoders, the W4100DSP (v3.4) and W4050DSP (to be released shortly).

Wavecom seems to be continually developing new features, new tools, and adding modes for the software. With the introduction of the W40PC — a low-cost variant of the W41PC — they have finally introduced a unit aimed directly at the hobbyist sector. Check out the Wavecom homepage at **http://www.wavecom.ch** or see the Klingenfuss Publications pages for some great screen shots at **http://ourworld.compuserve.com/homepages/klingenfuss/hotfrequ.htm**

Hoka

Hoka offers the Code3 (v5.0), Code3 Gold (v1.5W), Code30 (v2.7) and the Code300. The Code300 is a complete standalone unit built into a 19-inch rack PC that incorporates the Code30. The Code3, Code3G and Code30 all require a PC for the software and a serial port for the Code3 or Code3G or an AT slot for the Code30 card.

The Hoka line has always offered a complete set of sophisticated tools and covered a large number of recognized modes. Check out the Hoka homepage at **http://www.hoka.net** or great information at **http://www.tecna.it/lbarbi/**.

Universal

Universal offers the commercially available M-8000v7.5 (v7 is government restricted) and M-450v1.5 but still offers the older M-900v2 and M-1200. All Universal decoders are standalone, but there are a few third party offerings, most notably ScanCat's COPYCAT, that allow PC based control.

Now What?

Now that you have the equipment capable of analyzing complex signals, what kind of tools can you expect to find? Both Wavecom and Hoka are graphically based and do a great job of visualizing the structure of a signal. Tools you can expect to use over and over are tools such as:

Auto Correlate: a great tool for detecting bit patterns within a signal. Also needed to detect those signals that are running with encryption. Encrypted signals will show no bit pattern at all. If you know a signal is encrypted, log it and move on.

Oscilloscope: precise signal tuning is vital for proper signal decoding. Any mistuning can introduce drift and this can cause unexpected bits to be inserted into the output stream.

Shift Speed measurement: precise baud rate measurement is one of the most important signal parameters available. A good decoder should be able to calculate a baud rate out to 3 or 4 decimal places.

Waterfall: To "see" the multi-channel makeup of a voice frequency telegraphy (VFT) signal is almost as good as having a fingerprint. Many VFT signals have a unique channel structure. A waterfall display is also great for visualizing the tone sequence of a multi tone signal.

Auto Classify: The "magic" module of an intelligent decoder. A good signal classification module can have you decoding a properly tuned signal in record time.

Phase display: phase detection of multi-phase signals.

We'll take an indepth look at tools in later columns.

Still around?

Some monitors on the World Utility News (WUN) list have reported hearing Federal Aviation Administration stations KLO87 (West Virginia) and KEM80 (headquarters in Washington, D.C.) sending 170/110R ASCII as part of the National Airspace System Recovery Communications/National Communications System Exercise. Frequencies used were 5860.0 and 8125.0 in logs posted by J. Metcalfe.

It's hard to believe that an ancient mode such as ASCII is still to be found in use in this day and age! ASCII was never that popular as a transmission mode and was mostly used by ham operators. As a data transmission mode it had no error correcting in its design, requiring a strong, clean signal to receive error free copy.

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Antarctica's Archangel on the Air

The only continent with only one shortwave broadcast station is Antartica, but until mid-February that was inactive, as LRA36 at Base Esperanza on the peninsula was waiting for a new 10 kW transmitter to arrive.

When it came up for tests with folk music and IDs, Radio Nacional Arcángel San Gabriel was heard better than ever in North America, as late as 0100 UT on 15475.8, first reported to us by John Cobb in Georgia who noted the signal was even better than RAE Buenos Aires on 15345 — supposedly 100 kW but believed to be very much less.

Appearances were sporadic, and then on March 1, St. Gabriel Day in the Catholic calendar, official broadcasts began, says Horacio Nigro, Uruguay, in *The Four Winds*, but on an earlier schedule, roughly 1800-2100 UT on Monday-Friday, reports Gabriel Iván Barrera, Argentina, also via *The Four Winds*. A few days later Saturday and Sunday were added at 1800-2000. As winter deepens, further changes would not be surprising.

Unfortunately, the VOA-Delano relay of Voice of Greece at 1800- 2200 on 15485 was so strong — beamed 75 degrees right across the US in what is really a domestic SW broadcast — that splatter from it blocked reception of LRA36 during its earlier timeslot.

Europeans had better luck, as Dave Kenny of the British DX Club reports best-ever reception of LRA36, and Finbarr O'Driscoll, Ireland, told *Review of International Broadcasting* that reception was good along the greyline.

P-mail is a bit slow to Antarctica, so the station now has electronic access via *esc38ant@satlink.net*, says Barrera, as well as fax and phone to 54-2964-421519.

If you can't hear it in the 1800-2100 period, it still pays to check 15475.8 kHz at other times; later in March, John Cobb and I heard it after 0000 with another test in the clear; and previously it was active in the 1400 UT area. Watch out for Africa Number One, Gabon, on 15475 until 1900. Longtime inactive LRA36 frequencies 6030 and 11955 were also listed as possibly to be used.

Aurorae permitting, Antarcticans no doubt can pick up many SW broadcasts intended for elsewhere. The only countries with token non-daily shortwave broadcasts to their personnel in Antarctica, Russia and France, have not been confirmed recently.

But Argentine army station LTA has been extremely active on 15820 LSB and/or USB relaying any or all Buenos Aires AM or FM stations to Antarctica. A great many different stations have been heard at unpredictable times, and the relays are done without their knowledge, says Barrera, so if the originating stations verify, it is only as a courtesy, since they have no official knowledge of the relays. You may hear music and all kinds of programming, but soccer has top priority. By the way, Argentina claims a sector of Antartica as its own, though international agreements maintain the continent is not to be carved up.

AUSTRIA This is an example of what all the second-tier broadcasters should do — publish week-in-advance program previews on their website: **http://www.orf.at/roi/uk/uk_home.htm** (Larry Nebron, *Review of International Broadcasting*)

BELARUS Following the tests of R. Baltic Waves and the successful funding for this project, the Belarusian telecom authorities have put Belarusian Radio 1 on 6230/6235 which was supposed to be the frequency choice for RBW. The signal is very wide and seems to be in FM mode. Email reception reports are urgently needed to (Rimantas Pleikys, *riplei@lrs.lt* - Project Coordinator RBW via *hard-core-dx*)

BRAZIL From March 29, R. Senado broadcasts M-F 1000-2200 on R. Nacional Amazonia's 6180 for northern and west/central Brazil (Marcio R. F. Bertoldi, Sao Carlos SP, Brazil) So the C-SPAN of Brazil is on SW! (gh)

BULGARIA R. Bulgaria doesn't stop its transmissions in Spanish since March 28, 1999 (*Panlview*) Announcement that they would be broadcasting "until March 28" simply referred to the validity of the current schedule until season change, rather than implying that the Spanish service would be terminated, so only a well-intentioned misunderstanding (Jorge Aloy, Argentina)

CANADA CBC was hit by a long, debilitating strike by technicians in mid-February; journalists later considered joining them, but got a last-minute settlement. Although RCI workers remained on the job, much of CBC programming carried on RCI was affected, and certain transmissions from Sackville were suspended (gh) Russian and Ukrainian via Sackville 1600-2000 disappeared (Anne Fanelli, NY, *Review of International Broadcasting*) Russian at 1800 heard only via Skelton relay 9795, 7235 (Sergey M. Kolesov, Ukraine, *Cumbre DX*)

What MUF will it take for RCI to use the 21 MHz band? I know they did at past solar peaks, but for A-99 not a single 21 MHz channel for any broadcast from any site (gh)

CHNX, 6130: Wayne Harvey, Chief Engineer, told Rich Hankison about their power on February 15th: "We are licensed to transmit 6130 at 500 watts. Due to the failure of our old transmitter we have been for the last 3-4 years broadcasting on a Harris solid state exciter at 40-50 W. We just installed a Marconi transmitter, output power 100 W, connected to a 6 MHz dipole about 40 feet above the ground, pointing NE-SW at the co-ordinates 44°40'49" N. Lat. 63°39'35" W. Long. We will in the future return to 500 W.

"I am surprised how far we are getting with only limited power but it has been interesting hearing from our listeners so far away... To reduce our power has been due to finances and nothing more." ((c) *Cumbre DX*) Their E-mail address is *chns@ns.sympatico.ca* (Kolesov, *ibid.*) 6130 CHNX Halifax using only USB (nothing on LSB) also well audible with usual "Oldies 96" as well as weather, "— a maritime broadcasting system station." Can still copy this one at 0910, one hour after sunrise in mid-Feb (Noël Green, UKoGBaNI, *BC-DX*)

Radio McGill, 90.3 MHz, Montreal, started streaming online in Feb, including our *International Radio Report* Sundays at 10:30 am ET (summer timing 1430 UT), which reaches its 600th edition May 9. Everyone is invited to listen at **http://www.ckut.ca** (Sheldon Harvey and William Westenhaver, *IRR*)

CENTRAL AFRICAN REPUBLIC Good news for those who didn't succed in picking up the very weak signals from Radio Minurca

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; A-99=summer season, Mar-Oct; [non] = Broadcast to or for the listed country, but not necessarily originating there.

late 1998. David Smith informs me that Radio Minurca will have a new and more powerful transmittter by the end of March on 9900 (Stig Hartvig Nielsen, Denmark, *hard-core-dx*)

COLOMBIA Clandestine, Voz de la Resistencia, last reported on 6238, may verify through the following new address: Comisión Internacional, Apartado Postal 27552, C.P. 06761, México D.F., México. FARC-EP has a new home page called "Resistencia" at **http://www.contrast.org/mirrors/farc** and on this page there is a new E-mail address in addition to the *oldelbarcino@laneta.apc.org* (which so far has been of no use for reception reports). The new address is *farc-ep@comision.internal.org* (Henrik Klemetz, Sweden, via *NU* via *Clandestine Radio Watch*)

Voz de la Resistencia on new 6168.3 1146-1201 March 6 ex-6239. Political comments and music. Comunicado of Comando Central del Magdalena. Not La Voz de la Selva from Florencia, 6170 — inactive for several years (Rafael Rodriguez R., Bogotá, Colombia)

La Voz de la Resistencia del Bloque Oriental heard March 11 on 6170 [approx.?] closing after 1200 giving sked converting to 1130 and 2130 UT on this frequency and "VHF 7735" [whatever that means] at 1700-1800. During the morning broadcast they also read a press release blaming their 10th Front Commander Galdardo for executing three American missionaries without consulting higher FARC authority, and dumping their bodies over the Venezuelan border. Said it was not FARC policy to disappear Colombians or people of other nationalities, but the Americans had entered Cubas indian territory without permission. People should identify themselves and ask FARC for permission to avoid such lamentable incidents. FARC combatants are not turned over to other states, but Galdardo would be punished according to FARC law, signed by Jorge Suárez Briceño (via Jorge García Rangel, Venezuela)

CONGO [KINSHASA] R. Bukavu, 6713 USB, heard in late Feb 1620-1804* with African songs, French, Swahili, very poor; next day 1600-1803* (Mahendra Vaghjee, Mauritius) R. Bukavu — Although continues to identify as "RTNC Bukavu" (RTNC = Radio-Television Nationale Congolaise) it is currently controlled by rebel forces of the Congolese Rally for Democracy (RCD) and no longer relays programming from RTNC in Kinshasa. Is on 6713.3 USB and 88.04 FM to domestic targets only, multilingual daily 0400-0650, 0900-1800 including news in French at 0430, 1030 and 1630; news in Swahili at 0630 ((c) BBC Monitoring) By March R. Congo was heard on 5066 1550-1650+, nothing on 6713-USB (Vaghjee)

COSTA RICA We have just begun limited on-demand audio services. Links to the program(s) will be from our web site at **http://www.clark.net/pub/cwilkins/rfpi/webcast.html** (Joe Bernard, RFPI) Started with one episode of *Millennium Dreams*. I had already run across a bilingual Russian/English program — per RFPI's *VISTA* this is *Positive Living*, a Unity program for people in the Ural Mountains, scheduled Fri 0300, ergo also Thu 1900, Fri 1100 [if on, believed not to be currently at that hour]. Furthermore, there is also a new Swahili program, *ABS Radio: Radio for African Democracy* sesquihour later for an hour, i.e. Thu 2030, Fri 0430, 1230 produced by a Nigerian, about Nigeria's problems. Why a Nigerian would speak and produce about Nigeria in Swahili, I have no idea. Could it really be in some Nigerian language? (gh)

CUBA [non] "A survey carried out by the US Department of State in September 1998 of the Cuban populace indicates that Radio Martí is at its lowest point of listeners since it first broadcast in 1985. The poll was conducted without the permission of the Cuban government and it indicates that only 9% of Cubans listen to Radio Martí." (Rosa Townsend, El País via Mastrapa) FYI, a 1995 survey showed 76 percent of Cuban populace listened to R. Martí (Armando F. Mastrapa, *Clandestine Radio Watch*)

"DEUTSCHES REICH" [non] Ernst Zundel is back on the air, heard on WGTG ("With Glory To God") 9400 until 1635 on a Monday, saying that Roosevelt and the Jews were responsible for WW II (Tim Hendel, AL, *World of Radio*) What a way to "glorify God!" Checked the next day at 1610 as Frantz was easing into USB during his rant against so-called Christians he had dealings with who were really "lying dogs." Said Zundel was example of RESPONSIBLE —emphasis his— free speech, and Zundel doesn't sound unreasonable. Finally started *Voice of Freedom* at 1619 (gh)

Dave Frantz said it has been on for a couple of weeks and is on 1600 to 1630 Mon to Thu [if still, presumably 1500-1530 summer] (Hans Johnson, FL, *Cumbre DX*) We are no longer maintaining WGTG's website. New site is **http://www.wgtg.org** (Tom Sundstrom, *NASWA Journal*)

DOMINICAN REPUBLIC Radio Barahona reactivated on 4930 heard at 1014-1058, not heard in evenings nor every morning (Hans Johnson, FL, *Cumbre DX*) Daily in 1030-1100 period with news, fairly weak and quite distorted (Dave Valko, PA, *ibid.*)

FINLAND Juhani Niinisto, head of YLE R. Finland, told me at the SWL Winter Fest that they do not plan to resume an evening broadcast to NAm this summer. Most Finns travelling in NAm do not have very good receivers and reception was not very good (tho we found it to be quite good) [and what about English which presumably was intended for non-Finns?! -gh]. Sked shows to NAm: 15400 kHz at 1200-1500 UT, and 17670 ex-17660 at 1200-1400; includes English daily at 1230-1300. Have considered resuming longer English broadcast on Sunday mornings, but not likely this year (Joe Hanlon, PA, *World of Radio*)

INDONESIA In absence of RCI 15150 during strike, VOI heard on 15149.80 kHz at 2001 UT in English, intended progam actually started promptly at 2000; however, tape was playing backwards probably due to an engineering error. Signal very strong and readable but degrading with time (Mark Fine, VA, DSWCI *DX Window*) Same wrong tape recording also audible here in Salzburg, one week later! (Christoph Ratzer, Austria, *DX Window* ed.)

IRAN [non] WWCR's Persian program retimed in Feb to M-F 1400-1430 UT on 15685 kHz, instead of Th/F/Sa 1100-1200 on 12160; ought to be optimum time and frequency for actually reaching Iran from WWCR; if still on, summer timing would be 1300-1330. ID only as R. International, mentioned both Teheran and Dushanbe probably in giving local times (gh)

Anybody can find some info about us in the net. Our address is **http://www.chair.org** — CHAIR stands for Committee for Humanitarian Assistance to Iranian Refugees (Ali "Eric" Javadi, via Tom Sundstrom) Some other pages detail specific cases of mistreatment of refugees, and in particular of women in Iran. Nothing found on the site about the radio program. Since CHAIR clearly opposes the Islamic Republic of Iran, I believe it and its program qualify as clandestine (gh)

IRAQ Rep. of Iraq R. in Arabic heard on Feb 15-20: 1700-2000 UT on new 11650 kHz, SINPO 34433, ex-11785/9684.9; 11650 also heard irregularly daytime v0900-1500v (*PanIview*, Bulgaria)

Mother of Battles Radio, Radio of All Arabs (Arabic: *idha'at umm al-ma'arik, idha'atu kul al-arab*) is a service of official Iraqi radio, intended to be received throughout the Arab world. This schedule lists only those frequencies that have recently been confirmed. As with all Iraqi radio services, transmitter operation may be erratic. All broadcasts will be one hour *earlier* in summer. Daily in Arabic 1700-2000 on 9715 and 693 kHz, including recordings of Saddam Husayn speeches at 1815-1830, Political commentary at 1910-1930 UT ((c) BBC Monitoring)

ISRAËL Kol Israel' summer timings last from April 2 to September 13. See their cool new website **http://www.israelradio.org** — which has complete schedules and recording of one English broadcast daily. (Doni Rosenzweig via John Norfolk, Ivan Grishin)

Harmonic heard. Hebrew phone-in show at 1607-1645+ on 23180 = 2 x 11590 (Finbarr O'Driscoll, Ireland, *Review of International Broadcasting*) 11590 kHz now scheduled 1600-1755 UT.

ITALY The new Marconi Radio International is on 11390 kHz AM, 0800-1015 UTC every Sunday; Address: C/o Via Umbria 1, IT-74100 Taranto (Ta); E-mail: *mrisw@hotmail.com* - Confirmation by QSL-card. Add 1 IRC/USD (Dario Monferini, *Play-DX*)

KIRIBATI Radio Kiribati's manager, Bill Reiher, told us they were still waiting for parts from the UK and it would be at least early April before they are back on (Hans Johnson, (c) *Cumbre DX*)

MÈXICO XEYU, R. UNAM heard again in daytime on 9600 kHz, strong signal but weak modulation (Hector García Bojoge, DF) 9600.1, classical music, 0330 ID (Richard Hankison, KS) Barely audible here after more classical music at 0559 ID, 0600 news (gh, OK)

Program info from R. Educación, 6185, is available at: **http://www.cnca.gob.mx/cnca/buena/radio/index.html** (*Noticias DX*)

MOLDOVA [non] R. Moldavia Spanish 1200-1225 UT and Romanian 1230-1255 UT on 15315 kHz — their 120 kW transmitter did all except broadcasting; frequency was filled with a terrible hum (similar to some digital broadcast tests), not recognizable but I could hear sombody talking below the noise. There seems to be a total transmitter failure in Moldavia. The hum was so bad that frequencies +/- 10 kHz were "jammed" effectively by all kinds of humming, the noise differs tremendously for each 5 kHz step. (Andre Schmidt, Germany, *Electronic DX Press*) On the positive side, I have noticed this noise during this hour on 15315 is just about the only European signal to make it through on 19m! (gh)

NICARAGUA I noted your report about R. Miskut in March *Monitoring Times*. FYI, I have just returned from station. Tower newly erected last summer got destroyed by Hurricane Mitch. FM transmitter sustained major water damage. Staff just re-erected tower. SW plate amplifier is being repaired at this time, as is FM transmitter. Operations continue on FM with auxiliary transmitter, and on SW 5770 with exciter. I just completed canoe tour of Rio Coco SW target area on Nicaraguan/Honduran border and SW signal is excellent there even with only exciter operating. It is expected possible to get 8877 PA operating again by summer if new tube can be acquired. I'll keep you informed on progress (John C. Freeman, Tech Systems, NC, Feb 27)

PERÚ Regarding R. Panorama on 5906.8 kHz, the location is definitely Recopampa, as I originally reported, not Lucmapampa as others propose. It is not a district but one of 24 *caseríos* in the District of Sorochuco. I have heard it again one morning relaying R. La Voz de los Andes, 1400 kHz which definitely transmits from Sorochuco (Rafael Rodríguez, Colombia)

RUSSIA VOR is running a contest until June for the 200th anniversary of the birth of the celebrated poet Aleksandr Pushkin. Listeners are asked to answer several questions (Elias Soboliev, VOR via Santa Rita DX Clube, Brazil) In Portuguese, but presumably in other languages including English, with more details in broadcasts, website (gh)

SA'UDI ARABIA BSKSA keeps appearing in English on SW contrary to schedules, perhaps by mistake: 21670 kHz puts out enormous signal at 1120-1200 UT (Morrison Hoyle, Foster, Victoria, *Electronic DX Press*) 15435 kHz at 1216-1227 English with final ID "This is Radio Riyadh" — good; simple switching error between Arabic Service and Foreign Language Service or new program format? (Mikhail Timofeyev, Russia)

SIERRA LEONE SLBS back on air, following damage to its offices and library of recordings, with local news once again. During the rebel occupation of Freetown, two staff members of SLBS — a man and a woman — were killed. Some staff are still missing. Cyril Juxon-Smith, the Officer in Charge of SLBS, reports that SLBS is appealing for tapes and discs to replace something of what has been lost (Commonwealth Broadcasting Association via *BC-DX*) SLBS engineers tell me that they are indeed back on shortwave using their 250 kW transmitter (although they wouldn't tell me what they are currently running it at, surely a fraction of 250 kW): 3316 kHz at 0600-0800 UT, 5980 kHz 0800-1800 UT, 3316 kHz 1800-0000 UT (Hans Johnson (c) *Cumbre DX*)

SLOVAKIA Seemingly AWR will use the Rimavska Sobota facilities in Slovakia again more extensively in A99 season, especially to cover Europe in German (Kai Ludwig, Germany)

SOMALIA R. Mogadishu, V. of the People, which was on 11204 for a few weeks, moved to frequencies between 6540 and 6754 in the evenings until 1900 or 2000*, varying greatly from day to day, such as 6754, 6540, 6584, 6620, 6604 kHz. Hargeisa was on 6844 one day, 7071 the next (Mahendra Vaghjee, Mauritius)

SUDAN [non] Clandestine on 7000, Voice of Freedom and Renewal, heard *1545-1745* (Mahendra Vaghjee, Mauritius)

TAIWAN R. Taipei International, in English direct, includes 1200-1300 UT to Australia on 9610 kHz, and *new* 1300-1500 UT to Asia on 15125 kHz (BBC Monitoring)

UKOGBANI Former director of the BBC World Service, 1986-1992, John Tusa, wrote some extremely critical comments about his successors, published in *The Observer*. Excerpts follow:

New crisis at the BBC: Turning off the World - I was sitting in the Bush House arcade a few months ago over a coffee when an old friend from the Russian Service joined me. 'I'll tell you what is going to happen here,' he offered. 'Now that the English services' programme-making departments have been dismantled and sent over to Shepherds Bush (the fruit of the previous round of John Birt's reforms), the language services are defenceless. From now on, the BBC will start the process of steadily cutting them down.' I would not have guessed that his assessment would have turned into cruel reality so quickly...

While public attention has usually been drawn to the impact and excellence of the English language World Service, the real impact of the BBC's external broadcasts has always come from its 40 or so services in other national languages, from Mandarin Chinese to Arabic, Russian, Nepalese, Sinhalese and Tamil. If the English service attracted some 35 million listeners, more than 100m listened in their national language.

These services represented an extraordinarily cost-effective way of getting through to mass, national audiences. They represented a perfect counterweight to the elite appeal of the English-language services.

For 50 years, World Service managing directors fought to defend the language services and to extend them, usually against Foreign Office resistance and sometimes with its co-operation. ... Now, staffed by managerial zealots with no sense of ethos or historical values, the very things the World Service once defended are being eagerly dismantled - by the BBC itself. And remember, there are more cuts to come. (via Daniel Say, rec.radio.shortwave via John Norfolk, John Figliozzi)

Derek Nimmo, stalwart of BBC's *Just A Minute* and stuttering comic actor, died Feb 24 following a serious fall at his home in December. He was 68 (*Daily Telegraph* via Joel Rubin; BBC News Online via Ivan Grishin; *The Times* via Mike Cooper)

USA *Spectrum* was to return Feb 14 after a long hiatus, per announcements on the *Mike Jarmus Show* (Alex Draper, Ont.) But it was delayed two weeks due to Mark's illness. Finally appeared March 1, UT Mon 0200-0300 on WWCR 5070, immediately announcing they coveted their old time of UT Sun 0300. Trouble is, that was occupied by the "DX Block" of VOA *Communications World* and *World of Radio* sponsored by Grove (summer timing 0200 UT Sun on 5070). (gh) No excuse on extended hiatus other than "stuff continued to happen." Stan Lockwood, Mark Emmanuel were on with Scott Fybush on phone and Dave Marthouse on phone from VA (Bob Thomas, CT)

You can find a current Int'l Broadcasting Bureau broadcast schedule by FREQUENCY here: **http://sds.his.com:4000/fmds_w/schedules/freqsked.txt** and by LANGUAGE here: **http://sds.his.com:4000/fmds_w/schedules/langsked.txt** It's updated daily so it should be pretty accurate. It includes the following broadcasters: Voice of America (VOA), Radio Free Europe (RFE), Radio Liberty (RL) and Radio Martí. While you're there check out some of the other stuff ... like the remote monitoring system at **http://voa.his.com/rms** (Bill Whitacre, IBB, *hard-core-dx*)

VOA's Radio Theatre recorded some plays in February, March and April at Arena Stage in Washington, for later broadcast on Nat'l Public Radio, and on VOA [presumably pre-empting other programming on weekends on short notice] — *The Substance of Fire*, *As Thousands Cheer* and *Diary of Anne Frank* (Jane Horwitz, *Washington Post* via Mike Cooper)

Into Tomorrow with Dave Graveline is a *live* three hour broadcast on many stations in the US. We are a network. Air time is Sundays at 2:06 p.m. Eastern Time. Following each broadcast we edit-out all the commercials and reduce it to a one hour program for Armed Forces Radio and Television Service (AFRTS) to air on their five networks the following weekend. Each network offers the program five times over the weekend, starting on Fri. You heard a satellite transmission relayed from Key West on SW. Catch us on the internet. We provide *live* audio and video. Send some e-mail questions for each of these shows and enjoy each excursion into tomorrow. (Steve Zeigler, Senior Producer *Into Tomorrow* with Dave Graveline **http://www.graveline.com** *steve@graveline.com* - A R N - The Advanced Radio Network - Consumer Electronics & Technology (via Björn Fransson, Sweden, *BC-DX*)

Until the Next, Best of DX and 73 de Glenn!

For the latest *WORLD OF RADIO* schedule see our website: **http://www.angelfire.com/ok/worldofradio**

Broadcast Loggings

GLOBAL FORUM

Gayle Van Horn

0015 UTC on 7345
CZECH REP.: Radio Prague. *Talking Point* show features World Radio Network. (Bob Fraser, Cohasset, MA) <**www.radio.cz**>

0023 UTC on 5039.2
PERU: Radio Libertad. Spanish. Peruvian cumbias music to time checks, "siete de la noche con veintiseis minutos." Station ID with fair signal quality. Peru's **Radio Madre de Dios** on 4950 at 0143. **Radio Cusco** on 6204.2 at 0152. (Nicolas Eramo, Buenos Aires, Argentina/*The Four Winds*)

0050 UTC on 9485
BULGARIA: Radio Bulgaria. *Keyword Bulgaria* show on monitoring pollution via biology. (Fraser, MA)

0114 UTC on 7245
GERMANY: Radio Free Europe. Russian broadcast, very good quality. (Lee Silvi, Mentor, OH) **Radio Vilnius**' German site 6120 at 0042. (Fraser, MA)

0211 UTC on 9835
HUNGARY: Radio Budapest. *Hungary Today* feature on exchange rates. (Howard Moser, Lincolnshire, IL) Website: <**www/kaf.radio.hu**>

0215 UTC on 4799.8
GUATEMALA: Radio Buenas Nuevas. Spanish religious text to hymns. Send your Spanish report to; 13020 San Sebastian, Huehuetenango, Guatemala. **Radio Kekchi** heard in Quecha, 4845 at 2345. (Giampiero Bernardini, Milan, Italy/*Gatflash!*) **La Voz Nahuala** 3360 at 0216-0226+. (Harold Frodge, Midland, MI)

0313 UTC on 9655
TURKEY: Voice of. Text on Balkan pipeline to update on NATO. (Moser, IL)
URL: <**www.tsr.gov.tr**>

0338 UTC on 15425
RUSSIA: Voice of. Text on open market reforms. (Moser, IL) VOR's program lineup on 5940 at 1900. (Jim Boynton, Newton, MA) *Moscow Mailbag* 5940 at 2015. (Fraser, MA) URL: <**www.vor.ru**> *New Market* feature on 7300 at 2114-2120+. (Frodge, MI)

0457 UTC on 12015
ECUADOR: HCJB. Biblical relations to current events. (Moser, IL) *Ham Radio Today* on Michael Faraday at 1930, 15115. (Fraser, MA) <**www.hcjb.org**>

0505 UTC on 9435
ISRAEL: Kol Israel. Talk on replacing Defense Minister and upcoming elections. (Moser, IL)

0510 UTC on 6110
JAPAN: Radio Japan/NHK. Sports update to report on archeologists' find in Japan. Audible 9505 at 1453. (Moser, IL)

0612 UTC on 15215
SOUTH AFRICA: Channel Africa. *African Games* update. (Moser, IL) Fair signal for sports interview 17860 at 1720. (Boynton, MA) Website: <**www.channelafrica.org**>

0635 UTC on 4845
MAURITANIA: ORTV de Maurtanie. Holy Koran recitations with 4845 frequency drifting to 4848.70, 4851.70 by 0700. Tentative ID at 0700 in Arabic, drifting to 4846.28. Recheck at 0750 with poor signal on 4844.64. (Piet Pijpers, Netherlands/*TFW*)

0819 UTC on 17835.22
PAKISTAN: Radio Pakistan. English service, // 15527.73 (both freqs distorted audio) with pop music tunes. Talk and ID in poor English. (Gianni Serra, Rome Italy/*TFW*) Station address: P.O. Box 1393, Islamabad 44000, Pakistan. (Serra, Italy/*TFW*) 1403 news to 1415 on 11570.14, noted on 15464.74 but less readable. Unusual conditions, probably due to K index of 4. (Mark Fine, Remington, VA)

0823 UTC on 6010
MEXICO: Radio Mil. Spanish. U.S. pop music program to ID. (Enzio Gehrig, Spain//HCDX) Mexico's **Radio Huayacocotla** 2390 at 2350-0004+. (Frodge, MI)

1055 UTC on 4955
PERU: Radio Cultural Amauta. Spanish. *Revista Biblica* signature tune and ID at 1101 as, "está transmitiendo Radio Cultural Amauta 4.955 kcs onda corta, Desde Huanta la bella esmeralda de los Andes." (Rafael Rodriquez, Santafé de Bogotá D.C., Colombia/*TFW*)

1230 UTC on 15155
FRANCE: Radio France Intl. *Club 9516.* (Fraser, MA) <**www.rfi.fr/**>

1306 UTC on 4890
PAPUA NEW GUINEA: NBC. Monitored 1315+ with English "*NBC News in Brief*" promos, including news on Bouganville. Closing ID as "Voice of Papua Radio," station interference from Peruvian station. (Frodge, MI)

1318 UTC on 4753
INDONESIA: RRI-Fak Fak (Irian Jaya). Easy-listening music program from host duo to "Fak-Fak" reference. (Frodge, MI)

1347 UTC on 9840
VIETNAM: Voice of. *Developments in Vietnam* to 1349, followed by *Songs About Ho Chi Minh City.* (Frodge, MI) Audible 2325 on 4960. (Benardini, Italy/*TFW*) English *0330 with world news. (Moser, IL)

1600 UTC on 15325
UNITED ARAB EMIRATES: Radio Dubai. Western pop music show to 1635 newscast, // 15395, 13675. (Boynton, MA)

1647 UTC on 4950
INDIA: All India Radio-Shimla. Hindu. Regional disco music to light regional music of fair quality. **AIR-Delhi** news on 3365 at 1835. (Zacharias Liangas, Thessaloniki, Greece/*Hard Core DX*) **AIR-Bangalore** *13780 at 1902-1908+ (Frodge, MI)* **AIR-Delhi** 11620 at 0205. (Moser, IL) AIR Website:<**http://air.kode.net/**>

1730 UTC on 15415
LIBYA: Voice of Africa. Five minutes of English news, // 15435. (Boynton, MA)

1745 UTC on 4195
CLANDESTINE: Voice of the Worker. Arabic. Folk songs to 1800 newscast to sign off. Clandestine **Voice of Iraqi Kurdistan** noted on 4085 at 1820. Lady announcer's ID to hymn at 1836*. ((Liangas, GRC/*HCDX*)

1836 UTC on 11920
THAILAND: VOA relay. English service with sports program, announcements to fair ID at 1845. **Radio Thailand** on 9535 at 1901. (Serra, Italy/*TFW*) Thai service on 4830 at 2218. (Liangas, GRC/*HCDX*) Real Audio available: <**www.radiothailand.com/**>

1950 UTC on 15315
Netherlands Antilles: Radio Netherlands Bonaire relay. *Media Network* program. (Boynton, MA; Fraser, MA) URL: <**www.rnw.nl**>

2001 UTC on 15149.80
INDONESIA: Voice of (Java). English program, music to 2003. Newscast read to 2012, with strong signal quality, degrading with time. Special thanks to Mark Veldhuis on SWL net for tip. (Fine, VA) Address: Kotak Pos No. 1157, Jakarta 10001, Indonesia.

2200 UTC on 3214.9
INDONESIA: RRI Manado (Sulawesi) Weak carrier on most evenings, traces of audio. SCI interval signal (*Song of the Coconut Island)* noted, signal quality too poor to monitor properly. Additional Indo's audible at 2200; **RRI Gorontalo** (Sulawesi) 3264.7 with IDs and recitations; **RRI Ternate** (Moluccas) 3344.8 weak, although normally easiest to hear in the evening; **RRI Merauke** (Irian Jaya) 3905 with SCI and music; **RRI Pontianak** (Kalimantan) 3976.1 noted under Radio Budapest; **RRI Serui** (Irian Jaya) 4606.5 weak with // 4925; **RRI Jambi** (Sumatra) 4925 weak with utility interferences. RRI Joggjakarta (Java) 7098.1 with news, SCI and very weak. (A.C. Rouw, Germany/*HCDX*)

2200 UTC on 5995
CANADA: Radio Canada Intl. *Madly Off In All Directions* program. (Fraser, MA; Boynton, MA) Website: <**www.rcinet.ca**>

2215 UTC on 5010
CHINA: CPBS 2/Huayi. Chinese text referring to Huayi, // 6890. **CPBS 1** 5030 at 2230. News program "shinwen hebao zhe zayao jiemo." (Liangas, GRC/*HCDX*)

2238 UTC on 7295
MALAYSIA: RTM 2/Radio Malaysia. English weather forecast, fair quality. (Liangas, GRC/*HCDX*)

2302 UTC on 15475.85
ANTARTICA: LRA36-Radio Nacional Arcangel. Music from 2302 to sudden 2357*. Frequency/meter band quote and IDs noted at 2326, 2338, 2345 and possibly 2351. ID sounded "canned" of fair quality. (Silvi, OH)

Thanks to our contributors — Have you sent in YOUR logs?
Send to ***Gayle Van Horn,*** *c/o Monitoring Times (or e-mail gayle@grove.net)*
English broadcast unless otherwise noted.

Gayle Van Horn, gayle@grove.net

The SWL QSL Card Museum

or, How I spent an afternoon in cyberspace.

Besides keeping a shortwave radio on my desk, another great thing about my job is having the opportunity to surf the Internet, as I did this afternoon — with Bob Grove looking over my shoulder! As an active DXer, card collector and columnist, I'm constantly seeking the latest in QSL trends and news.

The Shortwave Listener's QSL Card Museum <**www.antique-corner.com/SWLQSL/**> is an interesting site featuring QSL collections from various DXers. To view a QSL card from a particular continent, just click on the country name.

Jorma Mantyla of Finland says, "QSLs are historic documents." He has an impressive collection at <**www.kaapeli.fi/~jmantyla/eng.htm**> from over 25 years of DXing ... even one painted by Pablo Picasso for Spain's former Clandestine Radio España Independiente. Comments can go to <*jmantyla@kaapeli.fi*>

Jonathan's QSL Card Page <**www.qsl.net/kb5iav/**> has links to cards from mediumwave stations, amateur stations, and a nostalgic view of cards from former stations at *QSL Cards of the Past*. Wonder if he'd be interested in a Tristan du Cunha scanned copy?

Pete's Home Page, still under construction at press time, yields an excellent worldwide utility card collection. Go to the *QSL Card* link at <**www.q1mil.u-net.com/QSLPage.htm**>.

By far the best site is Martin Schoch's *QSL Info Page (QIP)* <**www.swl.net/swl-de/qsl-link.htm**> Surf to links of QSL photos, Help Pages, Online Reception Reports and Clandestine and Pirate Radio Watch. Nice site, Martin.

What's QSLing without a verification signer? Addressing your letter to a particular station personnel continues to be an important practice, proven to speed replies. The *Hard-Core DX* website <**www.kotalampi.com/hard-core-dx/vs.txt**> includes a list of verie signers for email and snail mail replies.

One more? Try *Nordic Shortwave Center* <**www.nordicdx.com/**>. A terrific link at the *LA QSL List* site includes *QSL Tips* and *Veri Signers* at: <**www.nordicdx.com/laqsl/index.html**>.

So there you have it, my afternoon in cyberspace ... and Bob looking over my shoulder ... what a job!

ETHIOPIA

Voice of the Revolution of Tigray, 5500 kHz. Full data two page verification letter signed by Fre Tesfamichael-Director, plus postcard. Received via registered mail in 53 days for a taped report and one U.S. dollar. Station address: P.O. Box 450, Mekelle, Tigray, Ethiopia. (Randy Stewart, Springfield, MO)

FINLAND

YLE/Radio Finland, 17660 kHz. Full data antenna card signed by R. Makela. Received in 12 days for an English report and mint stamps. Station address: Shortwave Centre, Makholmantie 79, FIN-28660 Pori, Finland. (Larry R. Zamora, Garland, TX) <*rfindland@yle.fi*> Website: <**www.yle.fi/rfindland**>

MEDIUM WAVE

CBW, 990 kHz AM. Full data card signed by J. Campbell plus program schedule. Received in 22 days for an AM report. Station address: 541 Portage Ave, Winnipeg, Manitoba, Canada R3B 2G1 Canada. (Terry Jones, Plankinton, SD)

CFRB, 1010 kHz AM. Full data card signed by Steve Cannery. Received in eight days for an English AM report, souvenir post card and shack photo. Station address: 2 St. Clair Ave., Toronto, Ontario M4V IL6 Canada. (Ed Lindley, Biddeford, ME)

WJR, 760 kHz AM. Full data QSL card, sticker, and unsigned letter. Received in 30 days for an English AM report, souvenir post card and shack photo. Station address: 2100 Fisher Bldg., Detroit, MI 48202. (Lindley, ME)

KJOI, 1510 kHz AM. Partial data letter signed by Arlene Robbins-Administrator (letter came from owner in Los Angeles). Received in 19 days for a taped report. Station address: P.O. Box 250028, Los Angeles, CA 90025. (Patrick Martin, Seaside, OR)

KLVL, Pasadena, TX, 1480 kHz AM. Personal note written on report, signed by James Madsen-Administration. Received in 93 days for an English report. Station address: 1302 N. Shepherd, Houston, TX 77008. (Martin, OR)

WLAM, Gorham, ME, 870 kHz AM. Partial data (wrong date) on green paper QSL card signed by Andy Armstrong-Chief Engineer. Received in 18 days for an English AM report. Station address: 912 Washington St., Auburn, ME (Harold Frodge, MI)

WTIC, 1080 kHz AM. Station info sheet and 9x12 certificate signed by Garnet Drakiotes. Received in 24 days for an English AM report, souvenir postcard and shack photo. Station address: 1 Financial Plaza, Hartford, CT 06103. (Lindley, ME)

(XETOL, Toluca, Mexico, 1130 kHz AM. Prompt email reply to follow up from Oscar Beltran-Sales Director of Headquarters for Corporacion Mexicana de Radiodifusion S.A. (to which XETOL belongs). Email address: <*cmr@internet.com.mx*> (Paul Ormandy, Oamaru, New Zealand/*Hard Core DX*)

MOLDOVA

Voice of Russia, 7125 kHz. Report verified via email in 8 days by Elena Frolovskaya-World Service English Service.<*letters@vor.ru*> Website <**www.vor.ru**> (B.Bagwell, St. Louis, MO)

OMAN

BBC Eastern Relay Station, 17785 kHz. Full data personal letter on Oman map QSL letterhead, signed by David Plater-A45XJ/G4MZY-Senior Transmitter Engineer. Received in 57 days for an English report and one U.S. dollar (returned with reply). Station address: P.O. Box 6898, 112 Ruwi Post Office, Muscat, Oman. (Stewart, MO)

PAPUA NEW GUINEA

Radio West New Britain, (New Britain) 3235 kHz. Full data personal letter signed by Ruben Bale-Program Manager. Received in 42 days for an English report. Station address: P.O. Box 412, Kimbe, WNBP, Papua New Guinea. (Enzio Gehrig, Denia, Spain/*HCDX*)

PIRATE

Blind Faith Radio, 6955 kHz USB. Full data computer generated color copy of Blind Faith album cover signed by Doc Napalm. Received in 46 days for a pirate report (no postage required). QSL maildrop: P.O. Box 293, Merlin, Ontario N0P 1W0 Canada. (Bill Wilkins, Springfield, MO)

Radio Bob's Communications Network, 6955 kHz USB. Full data hand-colored world and antenna card signed by Radio Bob. Received in 10 days for a pirate report (no postage required). QSL maildrop: P.O. Box 24, Lula, GA 30554. (Wilkins, MO)

Partial India Radio, 6955 kHz USB. Partial data *Indian Troops With Pakistan* sheet, signed by Harold Krishna, plus personal letter. Received in 63 days for a pirate report and three mint stamps. QSL maildrop: P.O. Box 146, Stoneham, MA02180. (Wilkins, MO)

SOUTH AFRICA

Trans World Radio, 7215 kHz. Full data Sentech antenna card signed by Kathy Otto, plus schedule. Received in 52 days for an English report and two IRCs. Station address: Sentech (Pty) Ltd., Shortwave Services, Private Bag X06, Honeydew 2040, South Africa. (Wilkins, MO)

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How to Use the Shortwave Guide

1: Convert your time to UTC.

Eastern and Pacific Times are already converted to Coordinated Universal Time (UTC) at the top of each page. The rule is: convert your local time to 24-hour format; add (during Daylight Savings Time) 4,5,6, or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (8:30 pm Eastern, 5:30 pm Pacific).

2: Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours—space does not permit 24-hour listings.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The letter stands for a day of the week, as indicated below, and the four digits represent a time in UTC.

S: Sunday T: Tuesday H: Thursday A: Saturday
M: Monday W: Wednesday F: Friday

3: Find the frequencies for the program or station you want to hear.

Look at the page which corresponds to the time you will be listening. Comprehensive frequency information for English broadcasts can be found at the top half of the page. All frequencies are in kHz.

The frequency listing uses the same day codes as the program listings; if a broadcast is not daily, those day codes will appear before the station name. Irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

4: Choose the most promising frequencies for the time, location and conditions.

Not all stations can be heard and none all the time on all frequencies. To help you find the most promising frequency, we've included information on the target area of each broadcast. Frequencies beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible. Every frequency is followed by one of these target codes:

al:	alternate frequency	am:	The Americas
as:	Asia	na:	North America
au:	Australia	ca:	Central America
pa:	Pacific	sa:	South America
va:	various	eu:	Europe
do:	domestic broadcast	af:	Africa
om:	omnidirectional	me:	Middle East

Consult the propagation charts. To further help you find the right frequency, we've included charts at the back of this section which take into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the region in which you live and find the chart for the region in which the station you want to hear is located. The chart indicates the optimum frequencies for a given time in UTC.

SWL Programs

Compiled by Jim Frimmel

Sundays

0023 Radio Exterior de Espana: "Radio Waves"
0045 BBC (am/eu): "Waveguide" (22nd)
0045 BBC (am/eu): "Write On"
0110 HCJB (am): "DX Partyline"
0123 Radio Exterior de Espana: "Radio Waves"
0130 Radio For Peace Intl: "Continent of Media"
0136 Radio Havana Cuba: "DXers Unlimited"
0200 Radio For Peace Intl: "World of Radio"
0258 Vatican Radio: "On-the-Air"
0200 WWCR #3 (Tennessee): "Communications World" (ABC)
0305 Australia, Radio: "Feedback"
0230 WWCR #3 (Tennessee): "World of Radio"
0336 Radio Havana Cuba: "DXers Unlimited"
0400 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0409 HCJB (am): "DX Partyline"
0323 Voice of Turkey: "DX Corner" (biweekly)
0508 Vatican Radio: "On-the-Air"
0523 Radio Exterior de Espana: "Radio Waves"
0536 Radio Havana Cuba: "DXers Unlimited"
0600 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0630 World Radio Network (WRN1): "World of Radio"
0545 WWCR #3 (Tennessee): "Ask WWCR" (9th,23rd)
0630 WWCR #3 (Tennessee): "World of Radio"
0734 Radio Vlaanderen Intl: "Radio World"
0836 Radio Korea: "Multiwave Feedback"
0905 BBC (am/eu): "Write On"
0905 BBC (am/eu): "Waveguide" (23rd)
0930 Radio For Peace Intl: "Continent of Media"
0930 Italy (AWR): "Wavescan"
1000 Radio For Peace Intl: "World of Radio"
1030 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
0930 WWCR #3 (Tennessee): "World of Radio"
1045 BBC (af): "Waveguide" (23rd)
1045 BBC (af): "Write On"
1034 Radio Vlaanderen Intl: "Radio World"
1138 Radio Korea: "Multiwave Feedback"
1045 WWCR #3 (Tennessee): "Ask WWCR" (9th,23rd)
1107 Radio Canada Intl: "The Mailbag"
1230 BBC (as): "Waveguide" (23rd)
1230 Italy (AWR): "Wavescan"
1230 BBC (as): "Write On"
1230 BBC (as): "Waveguide" (23rd)
1238 Radio Korea: "Multiwave Feedback"
1147 Radio Bulgaria: "Radio Bulgaria Calling"
1200 WRMI (Florida): "Wavescan"
1303 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
1235 Radio Canada Intl: "The Mailbag"
1354 Vatican Radio: "On-the-Air"
1336 Radio Canada Intl: "The Mailbag"
1500 World Radio Network (WRN1): "Communications World" (ABC)
1534 World Radio Network (WRN1): "Radio World"
1636 Radio Korea: "Multiwave Feedback"
1537 Radio Canada Intl: "The Mailbag"
1637 Radio Vlaanderen Intl: "Radio World"
1700 WWCR #1 (Tennessee): "Ask WWCR" (9th,23rd)
1830 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
1737 Radio Vlaanderen Intl: "Radio World"
1907 World Radio Network (WRN1): "Radio World"
1936 Radio Korea: "Multiwave Feedback"
2100 WBCQ (Maine): "Communications World" (ABC)
2105 BBC (am/eu): "Waveguide" (23rd)
2105 BBC (am/eu): "Write On"
2108 Radio Korea: "Multiwave Feedback"
2031 Radio Canada Intl: "The Mailbag"
2208 Radio Korea: "Multiwave Feedback"
2131 Radio Vlaanderen Intl: "Radio World"
2300 Radio For Peace Intl: "World of Radio"
2330 WHRA (Angel 5 Maine): "DXing with Cumbre"

Mondays

0000 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0106 Deutsche Welle: "World DX Meeting" (31st)
0100 WWCR #3 (Tennessee): "Spectrum" (live)
0230 Radio Korea: "Multiwave Feedback"
0131 Radio Canada Intl: "The Mailbag"
0307 Radio Canada Intl: "The Mailbag"
0330 WRMI (Florida): "Wavescan"
0500 WWCR #1 (Tennessee): "World of Radio"
0530 WWCR #1 (Tennessee): "Communications World" (ABC)
0700 Radio For Peace Intl: "World of Radio"
0745 WWCR #1 (Tennessee): "Ask WWCR" (10th,24th)
0905 BBC (as): "Write On"
0905 BBC (as): "Waveguide" (24th)
1040 All India Radio: "DX-ers Corner" (10th,24th)
1500 Radio For Peace Intl: "World of Radio"
1615 KTWR (Guam): "Pacific DX Report"
1840 All India Radio: "DX-ers Corner" (10th,24th)
2130 All India Radio: "DX-ers Corner" (10th,24th)
2135 Radio New Zealand Intl: "Mailbox" (10th,24th)

Tuesdays

0900 KTWR (Guam): "Pacific DX Report"
1230 WWCR #1 (Tennessee): "World of Radio"
1346 Radio Sweden: "MediaScan" (4th,18th)
1355 FEBC (Philippines): "DX Dial"
1446 Radio Sweden: "MediaScan" (3rd,17th)
1846 Radio Sweden: "MediaScan" (3rd,17th)
1900 Radio For Peace Intl: "World of Radio"
2046 World Radio Network (WRN1): "MediaScan" (3rd,17th)
2000 Polish Radio: "Polish Radio DX Club"
2111 Radio Havana Cuba: "DXers Unlimited"
2030 WWCR #1 (Tennessee): "World of Radio"
2311 Radio Havana Cuba: "DXers Unlimited"
2340 All India Radio: "DX-ers Corner" (4th,18th)

Wednesdays

0140 Radio Havana Cuba: "DXers Unlimited"
0146 Radio Sweden: "MediaScan" (5th,19th)
0246 Radio Sweden: "MediaScan" (5th,19th)
0300 Radio For Peace Intl: "World of Radio"
0335 Radio Havana Cuba: "DXers Unlimited"
0346 Radio Sweden: "MediaScan" (5th,19th)
0535 Radio Havana Cuba: "DXers Unlimited"
0730 HCJB (eu): "Ham Radio Today"
0930 HCJB (pac): "Ham Radio Today"
1100 Radio For Peace Intl: "World of Radio"
1315 FEBC (Philippines): "DX Dial"
1735 Radio New Zealand Intl: "Mailbox" (12th,26th)
1820 Argentina, RAE: "DX'ers Special"
1720 Polish Radio: "Polish Radio DX Club"
1930 HCJB (eu): "Ham Radio Today"
2100 Merlin Network One: "Atmospherics"
2200 WBCQ (Maine): "World of Radio"
2206 Radio Budapest Intl: "Radio Budapest DX Blockbuster"

Thursdays

0030 Australia, Radio: "Media Report"
0130 HCJB (am): "Ham Radio Today"
0239 Argentina, RAE: "DX'ers Special"
0345 Radio Budapest Intl: "Radio Budapest DX Blockbuster"
0430 HCJB (am): "Ham Radio Today"
0800 KTWR (Guam): "Pacific DX Report"
0953 Radio Netherlands Intl: "Media Network"
1030 Australia, Radio: "Media Report"
1153 Radio Netherlands Intl: "Media Network"
1230 World Radio Network (WRN1): "Media Report"
1220 Polish Radio: "Polish Radio DX Club"
1230 WWCR #1 (Tennessee): "Communications World" (ABC)
1454 Radio Netherlands Intl: "Media Network"
1753 Radio Netherlands Intl: "Media Network"
1954 Radio Netherlands Intl: "Media Network"
2330 Australia, Radio: "Media Report"

Fridays

0054 Radio Netherlands Intl: "Media Network"

Continued on page 41

Frequencies

0000-0100	Anguilla,Caribbean Beacon	6090am			
0000-0100 vl	Australia, ABC/Katherine	5025do			
0000-0100 vl	Australia, ABC/Tent Creek	4910do			
0000-0100	Australia, Radio	9660pa	12080as	15240pa	17715pa
		17795pa	21740pa		
0000-0015	Cambodia, Natl Radio Of	11940as			
0000-0100	Canada, CBC N Quebec Svc	9625do			
0000-0100	Canada, CFRX Toronto	6070do			
0000-0100	Canada, CFVP Calgary	6030do			
0000-0100	Canada, CHNX Halifax	6130do			
0000-0100	Canada, CKZN St John's	6160do			
0000-0100	Canada, CKZU Vancouver	6160do			
0000-0029 twhfa	Canada, R Canada Intl	6040am	9535am	11865am	
0000-0059	Canada, R Canada Intl	5960am	9755am		
0000-0100	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0000-0027	Czech Rep, R Prague Intl	11615na	13580na		
0000-0100	Ecuador, HCJB	9745na	12015na	21455va	
0000-0030	Egypt, Radio Cairo	9900am			
0000-0100 vl	Guatemala, Radio Cultural	3300do			
0000-0100	Guyana, GBC/Voice of	3290al	5950do		
0000-0045	India, All India Radio	5010do	7410as	9705as	9950as
		11620as	13625as		
0000-0015	Japan, Radio/NHK	6155eu	6180eu	9665af	11705na
		11815as	13650as		
0000-0100	Liberia,LCN/R Liberia Int	5100do			
0000-0100	Malaysia, Radio	7295do			
0000-0100	Malaysia, RTM Sarawak	7160do			
0000-0100 vl	Malaysia,RTM KotaKinabalu	5980do			
0000-0100 vl	Namibia, NBC	3270af	3289af		
0000-0100	Netherlands, Radio	6165na	9845na		
0000-0100	New Zealand, R NZ Intl	17675pa			
0000-0100	North Korea, R Pyongyang	11845am	13650am	15230am	
0000-0100 vl	Papua New Guinea, NBC	9675do			
0000-0030 mtwhfa	Serbia, Radio Yugoslavia	7115na			
0000-0100	Singapore,RCorp Singapore	6150do			
0000-0100	Spain, R Exterior Espana	6055am			
0000-0100	Sri Lanka, IBC Tamil	7460as			
0000-0030	Thailand, Radio	9655af	9680af	11905af	

0000-0030	UK, BBC World Service	3915as	7110as	11945as	17615as
0000-0100	UK, BBC World Service	5965as	5970sa	5975am	6175am
		6195as	9410as	9590am	9915sa
		11955as	12095sa	15310as	15360as
		17790as			
0000-0100	UK, Merlin Network One	3985eu	9600na	11985na	
0000-0100	Ukraine, R Ukraine Intl	5905eu	6020eu	6030na	7150as
		7205eu	7420eu	9560eu	
0000-0100	USA, KAIJ Dallas TX	5810na	13815al		
0000-0100	USA, KTBN Salt Lk City UT	15590am			
0000-0100	USA, KWHR Naalehu HI	17510as			
0000-0100	USA, Voice of America	7215as	9890as	11760as	15185as
		15290as	17735pa	17820as	
0000-0100 twhfa	USA, Voice of America	5995ca	6130ca	7405sa	9455ca
		9775sa	11695ca	13740sa	
0000-0030	USA, Voice of America	5995ca	6130ca	7405sa	9455ca
		9775sa	11695ca	13740sa	
0000-0100	USA, WBCQ Monticello ME	7415na			
0000-0100	USA, WEWN Birmingham AL	5825na	5850eu	13615na	
0000-0100	USA, WGTG McCaysville GA	5085am	6890na		
0000-0100	USA, WHRA Greenbush ME	7385na			
0000-0100	USA, WHRI Noblesville IN	5745na	7315sa		
0000-0100	USA, WINB Red Lion PA	11950ca			
0000-0100	USA, WJCR Upton KY	7490na	13595as		
0000-0100 m	USA, WRMI/R Miami Intl	9955am			
0000-0100	USA, WRNO New Orleans LA	7355na			
0000-0100	USA, WSHB Cypress Crk SC	7535al	9430na	15285am	
0000-0100 as	USA, WWBS Macon GA	11900na			
0000-0100	USA, WWCR Nashville TN	3215na	5070na	7435na	13845na
0000-0100	USA, WYFR Okeechobee FL	6085na	9505na		
0000-0030 vl	Vanuatu, Radio	4960do			
0015-0100	Japan, Radio/NHK	6155eu	6180eu	9665af	11705na
0030-0100	Austria, R Austria Intl	9655na			
0030-0100	Iran, VOIRI	6060na	9022eu	9685am	
0030-0000	Lithuania, Radio Vilnius	9855na			
0030-0100 vl	Solomon Islands, SIBC	5020do			
0030-0100	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0030-0100	Thailand, Radio	9655as	11905as	13695am	
0050-0100	Italy, RAI Intl	6010na	9675na	11800na	

Selected Programs

Sundays

0000 Costa Rica, R Peace Intl: Every Living Thing. An hour of environmental and ecology topics for young listeners.
0000 Ecuador, HCJB Quito (am): Nite Brite Kid's Club. New program - no information available.
0030 Ecuador, HCJB Quito (am): Saludos Amigos. An international friendship program with listener contributions presented by Ken MacHarg.

Mondays

0000 Ecuador, HCJB Quito (am): A Firm Foundation. Ken Smith with a biographical sketch of a notable personality.
0005 Ecuador, HCJB Quito (am): Hour of Decision. See S 1200.
0030 Ecuador, HCJB Quito (am): Mountain Meditations. See S 1330.

Tuesdays

0000 Costa Rica, R Peace Intl: RadioNation. See S 0500.
0000 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
0028 Ecuador, HCJB Quito (am): Money Minute. See S 0000.
0030 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
0056 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.
0057 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Wednesdays

0000 Costa Rica, R Peace Intl: A Public Affair. See T 1600.
0000 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
0028 Ecuador, HCJB Quito (am): Money Minute. See S 0000.
0030 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
0056 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.
0057 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Thursdays

0000 Costa Rica, R Peace Intl: Alternative Radio. See M 0100.
0000 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
0028 Ecuador, HCJB Quito (am): Money Minute. See S 0000.
0030 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
0056 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.
0057 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Fridays

0000 Costa Rica, R Peace Intl: Our Americas. See T 0100.
0000 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
0028 Ecuador, HCJB Quito (am): Money Minute. See S 0000.
0030 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
0056 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.
0057 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Saturdays

0000 Costa Rica, R Peace Intl: Millennium Dreams. See S 0400.
0000 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
0028 Ecuador, HCJB Quito (am): Money Minute. See S 0000.
0030 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
0056 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.
0057 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

SWL Programs, continued from page 40

Saturdays

0453 Radio Netherlands Intl: "Media Network"
1030 KTWR (Guam): "Pacific DX Report"
1900 Radio For Peace Intl: "Continent of Media"
1930 Radio New Zealand Intl: "Mailbox" (14th,28th)
1930 Radio For Peace Intl: "World of Radio"
1947 Radio Bulgaria: "Radio Bulgaria Calling"
2000 WWCR #1 (Tennessee): "Ask WWCR" (7th,21st)
2105 Australia, Radio: "Feedback"
2300 WHRA (Angel 5 Maine): "DXing with Cumbre"
2238 Voice of Turkey: "DX Corner" (biweekly)

Saturdays

0005 Australia, Radio: "Feedback"
0005 BBC (as): "Waveguide" (23rd)
0005 BBC (as): "Write On"
2352 Radio Bulgaria: "Radio Bulgaria Calling"
0136 Voice of America (News Now): "Communications World" (A)
0230 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0300 Radio For Peace Intl: "Continent of Media"
0330 Radio For Peace Intl: "World of Radio"
0336 Voice of America (News Now): "Communications World" (B)
0245 Radio Bulgaria: "Radio Bulgaria Calling"
0338 Voice of Turkey: "DX Corner (biweekly)"
0415 WRMI (Florida): "Wavescan"
0536 Voice of America (News Now): "Communications World" (A)
0600 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0600 WHRI (Angel 1 Indiana): "DXing with Cumbre"
0600 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0605 Australia, Radio: "Feedback"
0710 HCJB (eu): "DX Partyline"
0800 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
0830 WHRI (Angel 1 Indiana): "DXing with Cumbre"
0830 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0910 HCJB (pac): "DX Partyline"
0936 Voice of America (News Now): "Communications World" (B)
0940 FEBC (Philippines): "DX Dial"
0845 WWCR #3 (Tennessee): "Ask WWCR" (8th,22nd)
1030 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
1100 Radio For Peace Intl: "Continent of Media"
1130 Radio For Peace Intl: "World of Radio"
1136 Voice of America (News Now): "Communications World" (A)

Continued on page 46

Frequencies

0100-0200	Anguilla,Caribbean Beacon	6090am			
0100-0200 vl	Australia, ABC/Katherine	5025do			
0100-0200 vl	Australia, ABC/Tent Creek	4910do			
0100-0200	Australia, Radio	9660pa	12080as	15240pa	15415as
		17715pa	17750as	17795pa	21740pa
0100-0200	Canada, CBC N Quebec Svc	9625do			
0100-0200	Canada, CFRX Toronto	6070do			
0100-0200	Canada, CFVP Calgary	6030do			
0100-0200	Canada, CHNX Halifax	6130do			
0100-0200	Canada, CKZN St John's	6160do			
0100-0200	Canada, CKZU Vancouver	6160do			
0100-0200	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0100-0200	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0100-0127	Czech Rep, R Prague Intl	7345na	11615na		
0100-0200	Ecuador, HCJB	9745na	12015na	21455va	
0100-0145	Germany, Deutsche Welle	6040na	6145na	9640am	11810na
		13720am			
0100-0200 s	Germany, Universal Life	15190eu			
0100-0130 m	Germany, V O Deliverance	6155na			
0100-0200 s	Germany,Good News World R	6155eu			
0100-0200 vl	Guatemala, Radio Cultural	3300do			
0100-0200	Guyana, GBC/Voice of	3290al	5950do		
0100-0130	Hungary, Radio Budapest	9560na			
0100-0200	Indonesia, Voice of	9525as	11765as	15510as	
0100-0130	Iran, VOIRI	6060na	9022eu	9685am	
0100-0110	Italy, RAI Intl	6010na	9675na	11800na	
0100-0200	Japan, Radio/NHK	6150af	11860as	11880af	15325as
		15570as	15590as	17685pa	17810as
		17835sa	21670pa		
0100-0200	Kenya, Kenya BC Corp	4885do			
0100-0200	Liberia,LCN/R Liberia Int	5100do			
0100-0200	Malaysia, Radio	7295do			
0100-0200 vl	Malaysia,RTM KotaKinabalu	5980do			
0100-0200 vl	Namibia, NBC	3270af	3289af		
0100-0125	Netherlands, Radio	6165na	9845na		
0100-0200	New Zealand, R NZ Intl	17675pa			
0100-0200 vl	Papua New Guinea, NBC	9675do			
0100-0200	Philippines, FEBC R Intl	15450as			
0100-0200	Russia,Voice of Russia WS	7180na	9875na	12020na	15595na
0100-0130	Serbia, Radio Yugoslavia	7130na			
0100-0200	Singapore,RCorp Singapore	6150do			
0100-0130	Slovakia, R Slovakia Intl	5930na	7300ca	9440sa	
0100-0200 vl	Solomon Islands, SIBC	5020do			
0100-0200	Spain, R Exterior Espana	6055am			
0100-0200	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0100-0130	Switzerland, Swiss R Intl	9885am	9905am		
0100-0200	UK, BBC World Service	5970sa	5975am	6175am	6195as
		9410as	9590am	9915sa	11955as
		12095sa	15280as	15310as	15360as
		17790as			
0100-0200	UK, Merlin Network One	3985eu	9600na	11875na	
0100-0200	USA, KAIJ Dallas TX	5810na	9815al		
0100-0200	USA, KJES Vado NM	7555na			
0100-0200	USA, KTBN Salt Lk City UT	7510na			
0100-0200	USA, KWHR Naalehu HI	17510as			
0100-0200	USA, Voice of America	7115as	7200as	9740as	9850as
		11705as	15250as	15300as	17740as
		17820as			
0100-0200 twhfa	USA, Voice of America	5995ca	6130ca	7405sa	9455ca
		9775sa	13740sa		
0100-0200	USA, WBCQ Monticello ME	7415na			
0100-0200	USA, WEWN Birmingham AL	5825na	5850eu	13615na	
0100-0200	USA, WGTG McCaysville GA	5085am	6890na		
0100-0200	USA, WHRA Greenbush ME	7385na			
0100-0200	USA, WHRI Noblesville IN	5745na	7315sa		
0100-0200	USA, WINB Red Lion PA	11950ca			
0100-0200	USA, WJCR Upton KY	7490na	13595as		
0100-0130 mtwhf	USA, WRMI/R Miami Intl	9955am			
0100-0200	USA, WRNO New Orleans LA	7355na			
0100-0200	USA, WSHB Cypress Crk SC	7535al	9430na	15285am	
0100-0200	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	15165as	
0100-0130	Uzbekistan, R Tashkent	5955as	5975as	7105as	7285as
		9540as			
0100-0127	Vietnam, Voice of	5940na			
0115-0145 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0130-0200	Sweden, Radio	13625as			
0130-0200 a	USA, WRMI/R Miami Intl	9955am			
0140-0150	Greece, Voice of	7450na	7475na	9375na	9420na
0140-0200	Vatican State, Vatican R	7335au	9650au		

Selected Programs

Sundays

0100 Costa Rica, R Peace Intl: Second Opinion. Matthew Rothschild, editor of "the Progressive" and guests present their ideas for solving the critical problems facing our world today.

0100 Ecuador, HCJB Quito (am): Latin and International News. Ten minutes of regional and world news.

0110 Ecuador, HCJB Quito (am): DX Partyline. New program host Allen Graham gives you plenty of information to help you get more fun out of shortwave listening.

0130 Costa Rica, R Peace Intl: Continent of Media. Glenn Hauser's monthly look at domestic media developments in the U.S.

Mondays

0100 Costa Rica, R Peace Intl: Alternative Radio. Featured speakers critique on multiculturalism, environment, racism,US foreign policy, media, and indigenous rights.

0100 Ecuador, HCJB Quito (am): Latin and International News. See S 0100.

0110 Ecuador, HCJB Quito (am): Musical Mailbag. HCJB staffers have a good time reading listener letters and playing music.

Tuesdays

0100 Costa Rica, R Peace Intl: Our Americas. The weekly report on Latin America and the Caribbean with Mario Murillo.

0100 Ecuador, HCJB Quito (am): News. A summary of world and regional news.

0110 Ecuador, HCJB Quito (am): Studio 9. Ralph Kurtenback and Curt Cole are the tour directors on your daily travel and adventure guide to life in Latin America.

0130 Ecuador, HCJB Quito (am): Adventures in Odyssey. Lively childrens' dramas from the "Focus on the Family" team.

Wednesdays

0100 Costa Rica, R Peace Intl: Global Community Forum/Far Right Radio Review. See M 1420.

0100 Ecuador, HCJB Quito (am): News. See T 0100.

0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.

0130 Ecuador, HCJB Quito (am): El Mundo Futuro. Allen Graham with the world of science and technology and a "Computer Corner" segment.

Thursdays

0100 Costa Rica, R Peace Intl: RFPI's Mailbag. See S 0230.

0100 Ecuador, HCJB Quito (am): News. See T 0100.

0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.

0130 Costa Rica, R Peace Intl: Making Contact. See S 0330.

0130 Ecuador, HCJB Quito (am): Ham Radio Today. John Beck with features, tips, news, and helps for radio amateurs.

Fridays

0100 Costa Rica, R Peace Intl: A Public Affair. See T 1600.

0100 Ecuador, HCJB Quito (am): News. See T 0100.

0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.

0130 Ecuador, HCJB Quito (am): Woman to Woman. Focus on topics of concern.

Saturdays

0100 Costa Rica, R Peace Intl: Disability Radio Worldwide. See S 0600.

0100 Ecuador, HCJB Quito (am): News. See T 0100.

0105 UK, BBC London (EAs): NEW! The Edge. A two-hour program of music, humor, chat and information every Saturday and hosted by Kirsten O'Brien and Steve Merchant.

0110 Ecuador, HCJB Quito (am): Studio 9. See T 0110.

0130 Costa Rica, R Peace Intl: Indigenous Voices. See T 0330.

0130 Ecuador, HCJB Quito (am): Musica del Ecuador. Jorge Zambrano presents a unique mix of Ecuadorian music and friendly chatter (highly rated).

Hauser's Highlights

BELGIUM: R Vlaanderen Intl

A-99 English expands use of Bonaire relay:

UTC	via	kHz	Target area
0400-0430	BON	15565	N America
0700-0730	WAV	9925	NW Europe
0700-0730	WAV	15195	E Europe
1130-1200	WAV	5985	S Europe
1730-1800	WAV	5910	N Europe
1730-1800	WAV	9925	S Europe
1730-1800	MAD	11840	S Africa
1730-1800	JUL	13685	ME; SE Europe
1930-2000	JUL	5960	Europe
2230-2300	BON	15565	N America

BON = Bonaire, Dutch Antilles
JUL = Juelich, Germany
MAD = Talata, Madagascar
WAV = Wavre, Belgium
Reception reports: info@rvi.be
More information: **http://www.rvi.be**

(Paul Brehms, rec.radio.shortwave via John Norfolk)

Frequencies

0200-0300	Anguilla,Caribbean Beacon	6090am			
0200-0300 twhfa	Argentina, RAE	11710am			
0200-0300 vl	Australia, ABC/Katherine	5025do			
0200-0300 vl	Australia, ABC/Tent Creek	4910do			
0200-0300	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
0200-0210	Bangladesh, Bangla Betar	4880as			
0200-0230 smwfa	Belarus, R Minsk	7210va	11670va		
0200-0300	Bulgaria, Radio	9400na	11700na		
0200-0300	Canada, CBC N Quebec Svc	9625do			
0200-0300	Canada, CFRX Toronto	6070do			
0200-0300	Canada, CFVP Calgary	6030do			
0200-0300	Canada, CHNX Halifax	6130do			
0200-0300	Canada, CKZN St John's	6160do			
0200-0300	Canada, CKZU Vancouver	6160do			
0200-0259	Canada, R Canada Intl	6155am	9535am	9755am	9780am
		11865am			
0200-0300	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0200-0300	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0200-0300	Ecuador, HCJB	9745na	12015na	21455va	
0200-0300	Egypt, Radio Cairo	9475na			
0200-0245	Germany, Deutsche Welle	9615as	9690as	11945as	11965as
		13690as	15560as		
0200-0300	Germany,Overcomer Ministr	5910au			
0200-0300	Guyana, GBC/Voice of	3290al	5950do		
0200-0300 irreg	Iraq, Radio Iraq Intl	11785am			
0200-0300	Kenya, Kenya BC Corp	4935do			
0200-0300	Malaysia, Radio	7295do			
0200-0300	Myanmar, Radio	7185do			
0200-0300 vl	Namibia, NBC	3270af	3289af		
0200-0300	New Zealand, R NZ Intl	17675pa			
0200-0230	Pakistan, Radio	15455as			
0200-0300 vl	Papua New Guinea, NBC	9675do			
0200-0300	Philippines, FEBC R Intl	15450as			
0200-0300	Romania, R Romania Intl	5990na	9570na	11740as	11830na
		11940as	15380as		
0200-0300	Russia,Voice of Russia WS	7180na	9875na	12020na	15595na
0200-0300	Singapore,RCorp Singapore	6150do			
0200-0300 vl	Solomon Islands, SIBC	5020do			
0200-0300	South Korea, R Korea Intl	7275am	11725am	11810am	15575am
0200-0300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0200-0300	Taiwan, Radio Taipei Intl	5950na	9680na	11745va	11825pa
		15345as			
0200-0300	UK, BBC World Service	5970sa	5975am	6175am	6185am
		6195eu	9410me	9770af	9915sa
		11955as	15280as	15310as	15360as
		17790as			
0200-0300	UK, Merlin Network One	3985eu	9795na	11875na	
0200-0300	USA, KAIJ Dallas TX	5810na	9815al		
0200-0230	USA, KJES Vado NM	7555na			
0200-0300	USA, KTBN Salt Lk City UT	7510na			
0200-0300	USA, KVOH Los Angeles CA	9975am			
0200-0300	USA, KWHR Naalehu HI	17510as			
0200-0300	USA, Voice of America	7115as	7200as	9740as	9850as
		11705as	15250as	15300as	17740as
		17820as			
0200-0300	USA, WBCQ Monticello ME	7415na			
0200-0300	USA, WEWN Birmingham AL	5825va			
0200-0300	USA, WGTG McCaysville GA	3270na	5085am	6090am	
0200-0300	USA, WHRA Greenbush ME	7385na			
0200-0300	USA, WHRI Noblesville IN	5745na	7315sa		
0200-0300	USA, WINB Red Lion PA	11950ca			
0200-0300	USA, WJCR Upton KY	7490na	13595as		
0200-0300	USA, WRNO New Orleans LA	7355na			
0200-0300	USA, WSHB Cypress Crk SC	5850al	7535na	9430na	
0200-0300	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0210-0215 thfa/vl	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0215-0220	Nepal, Radio	5005as	7165as		
0230-0300	Austria, R Austria Intl	9655na	9870ca		
0230-0300	Hungary, Radio Budapest	9840na			
0230-0245	Pakistan, Radio	9470as	11975as	13609as	15486as
0230-0300 vl	Philippines, R Pilipinas	11805as	15120as	15270as	
0230-0300	Sweden, Radio	9495na			
0230-0257	Vietnam, Voice of	5940na			
0245-0300	Albania, R Tirana Intl	6115na	7160na		
0250-0300 sf	Greece, Voice of	7450na	7475na	9375na	9420na
0250-0300	Vatican State, Vatican R	7305ca	9605am		

Selected Programs

Sundays

0200 Costa Rica, R Peace Intl: World of Radio. Glenn Hauser's essential program for the shortwave listener.
0200 Ecuador, HCJB Quito (am): Solstice. A musical program from HCJB-Australia for young people.
0230 Costa Rica, R Peace Intl: RFPI's Mailbag. The latest news and happenings at RFPI and responses to listener letters.

Mondays

0200 Costa Rica, R Peace Intl: My Green Earth. An environment program for children that explores the world of animals, plants, and cultures. Check www.ptialaska.net/~kmxt/mge.htm for weekly topics.
0200 Ecuador, HCJB Quito (am): Radio Reading Room. Readings from new Christian books.
0230 Costa Rica, R Peace Intl: Every Living Thing. See S 0000.
0230 Ecuador, HCJB Quito (am): L'Abri Lectures. Dr. Francis Schaeffer Is the speaker.
0230 UK, BBC London (AF): Blues World. See H 0530.

Tuesdays

0200 Costa Rica, R Peace Intl: CounterSpin. See S 0300.
0200 Ecuador, HCJB Quito (am): Simply Worship. See S 1400.
0230 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
0230 Ecuador, HCJB Quito (am): Let My People Think. See S 1530.
0235 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
0240 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.
0244 Costa Rica, R Peace Intl: Tropical Conservation Newsbureau Report. A report on ecology in the western hemisphere.

Wednesdays

0200 Costa Rica, R Peace Intl: RadioNation. See S 0500.
0200 Ecuador, HCJB Quito (am): The Book and the Spade. The quest for biblical knowledge through archaeology.
0215 Ecuador, HCJB Quito (am): Words for Women. Helpful ideas for family living.
0230 Ecuador, HCJB Quito (am): Unshackled. Pacific Garden Mission's radio drama.

Thursdays

0200 Costa Rica, R Peace Intl: Second Opinion. See S 0100.
0200 Ecuador, HCJB Quito (am): Rock Solid! A new one-hour program of contemporary (rock) Christian music.
0230 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
0235 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
0240 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.
0245 Costa Rica, R Peace Intl: Midwest Today Radio Edition. Timely general interest topics from America's heartland.
0250 Costa Rica, R Peace Intl: Along the Color Line. Commentaries relevant to contemporary African-American issues featuring Dr. Manning Marable.

Fridays

0200 Costa Rica, R Peace Intl: Global Community Forum/Far Right Radio Review. See M 1420.
0200 Ecuador, HCJB Quito (am): Radio Reading Room. See M 0200.
0230 Ecuador, HCJB Quito (am): Inspirational Classics. Scott and Judy Gillen of New Zealand with a program of sacred classical music.

Saturdays

0200 Costa Rica, R Peace Intl: Beyond Growth. See T 0600.
0200 Ecuador, HCJB Quito (am): Inside HCJB. Paul Bell gives you a inside look at the Voice of the Andes.
0230 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
0230 Ecuador, HCJB Quito (am): Walkin' in the Sunshine. Ben Cummings serves as your host for this
0235 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
0240 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.
0245 Costa Rica, R Peace Intl: UN Perspective. See T 2330.

Hauser's Highlights

ISRAËL: Kol Israel

April 2 to September 13. See their cool new website **http://www.israelradio.org** for complete schedules and recording of one English broadcast daily.

UTC	kHz	Target	UTC	kHz	Target
0400-0415	9435	Europe/N. America	1900-1925	11605	Europe/N. America
	11605	Europe/N. America		15650	Europe/N. America
	17535	Australasia		17545	Europe/N. America
1030-1035	15650	N. America		15640	Africa
	17535	Europe/N. America	2330-2335	11585	Europe/N. America
1400-1430	15650	Europe/N. America		15640	Western N. America
	17535	Europe/N. America		15615	Europe/N. America

(Doni Rosenzweig via John Norfolk, Ivan Grishin)

Frequencies

0300-0400	Anguilla,Caribbean Beacon	6090am			
0300-0400 vl	Australia, ABC/Katherine	5025do			
0300-0400 vl	Australia, ABC/Tent Creek	4910do			
0300-0400	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
0300-0400	Australia,DefenseForces R	14790as			
0300-0400 vl	Botswana, Radio	4820do	7255do		
0300-0400	Canada, CBC N Quebec Svc	9625do			
0300-0400	Canada, CFRX Toronto	6070do			
0300-0400	Canada, CFVP Calgary	6030do			
0300-0400	Canada, CHNX Halifax	6130do			
0300-0400	Canada, CKZN St John's	6160do			
0300-0400	Canada, CKZU Vancouver	6160do			
0300-0329 twhfa	Canada, R Canada Intl	6155am	9755am	9780am	
0300-0359 sm	Canada, R Canada Intl	6155am	9755am	9780am	
0300-0356	China, China Radio Intl	9690am			
0300-0400	Costa Rica,RF Peace Intl	6975am			
0300-0400	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0300-0327	Czech Rep, R Prague Intl	7345na	9955na	11615na	
0300-0400	Ecuador, HCJB	9745na	12015na	21455va	
0300-0330	Egypt, Radio Cairo	9475am			
0300-0345	Germany, Deutsche Welle	6145na	9535na	9640na	11810na
		13780am	15105na		
0300-0400	Germany,Overcomer Ministr	5910au			
0300-0400 vl	Guatemala, Radio Cultural	3300do			
0300-0400	Guyana, GBC/Voice of	3290al	5950do		
0300-0400	Japan, Radio/NHK	17810as	17825ca	21610pa	
0300-0400	Kenya, Kenya BC Corp	4885do	4935do		
0300-0400 vl	Lesotho, Radio	4800do			
0300-0400	Malaysia, Radio	7295do			
0300-0330 stwhfa	Mexico, Radio Mexico Intl	5985al	9705am		
0300-0355	Moldova, R Moldova Intl	7500na			
0300-0400 vl	Namibia, NBC	3270af	3289af		
0300-0400	New Zealand, R NZ Intl	17675pa			
0300-0400 vl	Papua New Guinea, NBC	9675do			
0300-0330 vl	Philippines, R Pilipinas	11805as	15120as	15270as	
0300-0400	Russia,Voice of Russia WS	7125na	7180na	9850na	9875na
		12000na	12020na	12040na	13640na
0300-0330 s	Russia,Voice of Russia WS	12060na			
0300-0325	S Africa, Channel Africa	5955af			
0300-0400	Singapore,RCorp Singapore	6150do			
0300-0400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0300-0400	Taiwan, Radio Taipei Intl	5950na	9680na	11745as	11825as
		15345as			
0300-0330	Thailand, Radio	9655am	11905am	15460am	
0300-0400	Turkey, Voice of	7240va	9655va	21715va	
0300-0400	Uganda, Radio	4976do			
0300-0400	UK, BBC World Service	3255af	5975am	6005af	6175am
		6180eu	6185am	6190af	7160af
		9410eu	11730af	11760me	11765af
		11955as	12095af	15280as	15310as
		15420af	17760as	17790as	21660as
0300-0320	UK, BBC World Service	15360as			
0300-0400	UK, Merlin Network One	3985eu	9795na		
0300-0400	Ukraine, R Ukraine Intl	4820eu	6020eu	6030na	6080eu
		7150na	7205eu	7420eu	9560eu
0300-0400	USA, KAIJ Dallas TX	5810na	9815al		
0300-0400	USA, KTBN Salt Lk City UT	7510na			
0300-0400	USA, KVOH Los Angeles CA	9975am			
0300-0400	USA, KWHR Naalehu HI	17510as			
0300-0400	USA, Voice of America	6035af	6080af	7105af	7290af
		7340af	7415af	9575af	9885af
0300-0330 mtwh	USA, Voice of America	4960af			
0300-0400	USA, WBCQ Monticello ME	7415na			
0300-0400	USA, WEWN Birmingham AL	5825va			
0300-0400	USA, WGTG McCaysville GA	3270na	5085am	6890am	
0300-0400	USA, WHRA Greenbush ME	7385na			
0300-0400	USA, WHRI Noblesville IN	5745na	7315sa		
0300-0400	USA, WINB Red Lion PA	11950ca			
0300-0400	USA, WJCR Upton KY	7490na	13595as		
0300-0400	USA, WRMI/R Miami Intl	9955am			
0300-0400	USA, WRNO New Orleans LA	7395na			
0300-0400	USA, WSHB Cypress Crk SC	11930eu			
0300-0400	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0300-0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300-0310	Vatican State, Vatican R	7305ca	9605am		
0300-0327	Vietnam, Voice of	5905ca			
0300-0400	Zambia, Natl BC Corp	6165do	6265do		
0300-0400 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0310-0340	Vatican State, Vatican R	9660af			
0330-0400	Albania, R Tirana Intl	6115na	7160na		
0330-0357	Czech Rep, R Prague Intl	11600as	15530as		
0330-0350 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0330-0400 vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0330-0400	Sweden, Radio	9495na	12060na		
0330-0400	Tanzania, Radio	5050af			
0330-0400	UAE, Radio Dubai	12005na	13675na	15400na	21485na
0340-0350	Greece, Voice of	7450na	9375na	9420na	
0345-0400	Tajikistan, Radio	7245as	9905as	11620as	
0356-0400	Zambia, Christian Voice	3330af	6065af		

Selected Programs

Sundays

0300 Costa Rica, R Peace Intl: CounterSpin. Fairness and Accuracy in Media (FAIR) examines how the media reports key stories.
0300 Ecuador, HCJB Quito (am): Alive! Ron Hutchcraft.
0330 Costa Rica, R Peace Intl: Making Contact. Fresh perspectives on social and political dynamics in the US and around the world.

Mondays

0300 Costa Rica, R Peace Intl: Every Living Thing. See S 0000.
0300 Ecuador, HCJB Quito (am): The Sower. Michael Guido presents music and inspiration.
0315 Ecuador, HCJB Quito (am): The Word Today. A discussion of Biblical themes.
0320 UK, BBC London (AS): NEW! Talking Point (repeat). See S 1405.
0330 Costa Rica, R Peace Intl: Wisdom Radio Presents. Maryknoll media.
0330 Ecuador, HCJB Quito (am): Sounds of Joy. Bob Carlson with old recordings of sacred music.

Tuesdays

0300 Costa Rica, R Peace Intl: Disability Radio Worldwide. See S 0600.
0300 Ecuador, HCJB Quito (am): Hope for the Heart. June Hunt present's God's principles for today's marriage.
0313 Ecuador, HCJB Quito (am): Getting the Message. See M 1313.
0315 Ecuador, HCJB Quito (am): Rendezvous. Dick Saunders presents Bible study and evangelism.
0330 Costa Rica, R Peace Intl: Indigenous Voices. The goal of this series is to bring indigenous voices to the forefront in a significant way.
0330 Ecuador, HCJB Quito (am): MasterControl. A magazine program of current topics, lifestyle issues, and Christian themes.

Wednesdays

0300 Costa Rica, R Peace Intl: World of Radio. See S 0200.
0300 Ecuador, HCJB Quito (am): Hope for the Heart. See T 0300.
0313 Ecuador, HCJB Quito (am): Getting the Message. See M 1313.
0315 Ecuador, HCJB Quito (am): Rendezvous. See T 0315.
0330 Costa Rica, R Peace Intl: RFPI's Mailbag. See S 0230.
0330 Ecuador, HCJB Quito (am): Chords of Love. Music to encourage you.
0345 Ecuador, HCJB Quito (am): Wonderful Words of Life. Messages from the Salvation Army.

Thursdays

0300 Costa Rica, R Peace Intl: Every Living Thing. See S 0000.
0300 Ecuador, HCJB Quito (am): Hope for the Heart. See T 0300.
0313 Ecuador, HCJB Quito (am): Getting the Message. See M 1313.
0315 Ecuador, HCJB Quito (am): Rendezvous. See T 0315.
0330 Ecuador, HCJB Quito (am): The Living Word. See T 1430.

Fridays

0300 Costa Rica, R Peace Intl: Positive Living. Russian/English broadcast.
0300 Ecuador, HCJB Quito (am): Hope for the Heart. See T 0300.
0313 Ecuador, HCJB Quito (am): Getting the Message. See M 1313.
0315 Ecuador, HCJB Quito (am): Rendezvous. See T 0315.
0330 Ecuador, HCJB Quito (am): Viewpoint. Music and messages of inspiration from the radio ministry of Church of God.

Saturdays

0300 Costa Rica, R Peace Intl: Continent of Media. See S 0130.
0300 Ecuador, HCJB Quito (am): Hope for the Heart. See T 0300.
0313 Ecuador, HCJB Quito (am): Getting the Message. See M 1313.
0315 Ecuador, HCJB Quito (am): Rendezvous. See T 0315.
0330 Costa Rica, R Peace Intl: World of Radio. See S 0200.
0330 Ecuador, HCJB Quito (am): On Track. Good comtemporary music and helpful thoughts.

Hauser's Highlights

ECUADOR:

HCJB - The Voice of the Andes

28th March-31st October 1999 - English schedule

UTC	Target	kHz
0000-0400	ECNAm	9745 12015
0400-0700	WCNAm	9745 12015
0700-0900	Eu	11950
0700-1100	Au	15115
1100-1600	Am	12005 15115
1900-2200	Eu	17725

(HCJB via British DX Club)

Frequencies

0400-0500	Anguilla,Caribbean Beacon	6090am			
0400-0430	Armenia, Voice of	4810va			
0400-0500 vl	Australia, ABC/Katherine	5025do			
0400-0500 vl	Australia, ABC/Tent Creek	4910do			
0400-0500	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
0400-0500	Australia,DefenseForces R	14790as			
0400-0426	Belgium,R Vlaanderen Intl	15565na			
0400-0500 vl	Botswana, Radio	4820do	7255do		
0400-0500	Canada, CBC N Quebec Svc	9625do			
0400-0500	Canada, CFRX Toronto	6070do			
0400-0500	Canada, CFVP Calgary	6030do			
0400-0500	Canada, CHNX Halifax	6130do			
0400-0500	Canada, CKZN St John's	6160do			
0400-0500	Canada, CKZU Vancouver	6160do			
0400-0429	Canada, R Canada Intl	6150me	9505me	9645me	
0400-0456	China, China Radio Intl	9730am			
0400-0500	Costa Rica,RF Peace Intl	6975am			
0400-0500	Cuba, Radio Havana	6000na	9820na	11705na	
0400-0500	Ecuador, HCJB	9745na	12015na	21455va	
0400-0445	Germany, Deutsche Welle	7225af	9565af	9765af	11785af
		13690af			
0400-0500	Guyana, GBC/Voice of	3290al	5950do		
0400-0415	Israel, Kol Israel	9435va	11605va	17535au	
0400-0500	Kenya, Kenya BC Corp	4885do	4935do		
0400-0500 vl	Lesotho, Radio	4800do			
0400-0410 vl/m-f	Malawi, MBC	5993do			
0400-0500	Malaysia, Radio	7295do			
0400-0430 twhfa	Mexico, Radio Mexico Intl	5985al	9705am		
0400-0425	Moldova, R Moldova Intl	7500na			
0400-0500	New Zealand, R NZ Intl	17675pa			
0400-0500 vl	Papua New Guinea, NBC	9675do			
0400-0500	Romania, R Romania Intl	9570na	11940na	15325as	17720as
0400-0500	Russia,Voice of Russia WS	7125na	7180na	9850na	12000na
		12020na	12040na	13640na	
0400-0430	S Africa, Channel Africa	5955af			
0400-0500	Singapore,RCorp Singapore	6150do			
0400-0430	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0400-0430	Switzerland, Swiss R Intl	9885am	9905am	13635eu	
0400-0430	Tanzania, Radio	5050af			
0400-0500	Uganda, Radio	4976do			
0400-0500	UK, BBC World Service	3255af	3955eu	5975am	6005af
		6175am	6180eu	6185am	6190af
		6195eu	7160af	9410eu	11760me
		11765af	11955as	12095af	15280as
		15310as	15420af	15575as	17640as
		17760as	17790as	21660as	
0400-0500	UK, Merlin Network One	3985eu	9795na		
0400-0500	USA, KAIJ Dallas TX	5810na	9815al		
0400-0500	USA, KTBN Salt Lk City UT	7510na			
0400-0500	USA, KVOH Los Angeles CA	9975am			
0400-0500	USA, KWHR Naalehu HI	17780as			
0400-0500	USA, Voice of America	6035af	6080af	7170af	7290af
		7415af	9575af	9775af	9885af
0400-0500	USA, WBCQ Monticello ME	7415na			
0400-0500	USA, WEWN Birmingham AL	5825va			
0400-0500	USA, WGTG McCaysville GA	3270na	5085am		
0400-0500	USA, WHRA Greenbush ME	7385na			
0400-0500	USA, WHRI Noblesville IN	5745na	7315sa		
0400-0500	USA, WINB Red Lion PA	11950ca			
0400-0500	USA, WJCR Upton KY	7490na	13595as		
0400-0500 twhfa	USA, WRMI/R Miami Intl	9955am			
0400-0500	USA, WRNO New Orleans LA	7395na			
0400-0500	USA, WSHB Cypress Crk SC	11930eu	15195af		
0400-0405	USA, WWCR Nashville TN	2390na	5070na	5935na	
0400-0405 mtwhf	USA, WWCR Nashville TN	3215na			
0400-0405 as	USA, WWCR Nashville TN	3210na			
0400-0445	USA, WYFR Okeechobee FL	6065na	9505na		
0400-0425	Vietnam, Voice of	5940na	7270na	7400na	9840na
		12019na			
0400-0500	Zambia, Christian Voice	3330af	6065af		
0400-0500	Zambia, Natl BC Corp	6165do	6265do		
0400-0500 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0405-0500	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0415-0440 vl	Italy, RAI Intl	5975af	7235af		
0430-0500	Austria, R Austria Intl	6155eu	13730eu		
0430-0500 a	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0430-0455	Moldova, R Moldova Intl	7500na			
0430-0500	Netherlands, Radio	6165na	9590na		
0430-0500 vl	Nigeria, Radio/Ibadan	6050do			
0430-0500 vl	Nigeria, Radio/Kaduna	4770do			
0430-0500	Nigeria, Radio/Lagos	3326do			
0430-0500	Swaziland, Trans World R	3200af	4775af		
0430-0500	Switzerland, Swiss R Intl	9885am	9905am		
0445-0500	USA, WYFR Okeechobee FL	9985eu			
0455-0500	Nigeria, Voice of	7255af	15120va		

Selected Programs

Sundays

0400 Costa Rica, R Peace Intl: Millennium Dreams. An RFPI-produced show hosted by James and Debra Latham that promises to be informational, entertaining and enlightening.
0400 Ecuador, HCJB Quito (am): Latin and International News. See S 0100.
0409 Ecuador, HCJB Quito (am): DX Partyline. See S 0110.

Mondays

0400 Costa Rica, R Peace Intl: Wisdom Radio Presents. See M 0330.
0400 Ecuador, HCJB Quito (am): Latin and International News. See S 0100.
0410 Ecuador, HCJB Quito (am): Musical Mailbag. See M 0110.
0430 Costa Rica, R Peace Intl: Voices of Our World. Maryknoll missionary Steve De Mott hosts this social justice magazine program that brings stories from the people who have lived them.

Tuesdays

0400 Costa Rica, R Peace Intl: Pacifica Network News. PNN is the only daily progressive news and analysis program produced in the US.
0400 Ecuador, HCJB Quito (am): News. See T 0100.
0410 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0430 Costa Rica, R Peace Intl: Millennium Dreams. See S 0400.
0430 Ecuador, HCJB Quito (am): Adventures in Odyssey. See T 0130.

Wednesdays

0400 Costa Rica, R Peace Intl: Pacifica Network News. See T 0400.
0400 Ecuador, HCJB Quito (am): News. See T 0100.
0410 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0430 Costa Rica, R Peace Intl: TUC Radio. Maria Gilardin.
0430 Ecuador, HCJB Quito (am): El Mundo Futuro. See W 0130.

Thursdays

0400 Costa Rica, R Peace Intl: Pacifica Network News. See T 0400.
0400 Ecuador, HCJB Quito (am): News. See T 0100.
0410 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0430 Costa Rica, R Peace Intl: Deep Ecology for the 21st Century. Michael Toms conducts interviews.
0430 Ecuador, HCJB Quito (am): Ham Radio Today. See H 0130.

Fridays

0400 Costa Rica, R Peace Intl: Pacifica Network News. See T 0400.
0400 Ecuador, HCJB Quito (am): News. See T 0100.
0410 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0430 Costa Rica, R Peace Intl: ABS Radio. Radio for African Democracy (Swahili).
0430 Ecuador, HCJB Quito (am): Woman to Woman. See F 0130.

Saturdays

0400 Costa Rica, R Peace Intl: Pacifica Network News. See T 0400.
0400 Ecuador, HCJB Quito (am): News. See T 0100.
0405 UK, BBC London (SAs): NEW! The Edge. A two-hour program of music, humor, chat and information every Saturday and hosted by Kirsten O'Brien and Steve Merchant.
0410 Ecuador, HCJB Quito (am): Studio 9. See T 0110.
0430 Costa Rica, R Peace Intl: RFPI's Mailbag. See S 0230.
0430 Ecuador, HCJB Quito (am): Musica del Ecuador. See A 0130.

Hauser's Highlights

CANADA: R Canada Intl

Noteworthy in the new A99 RCI schedule:
0500-0529 broadcast not only has Sackville frequencies but some now beamed to WNAm — 5995, 9755, 11830 kHz.
1200-1359 (Sat/Sun -1259) has four frequencies, two of them on the 16 mb — 9640, 13670, 17765, 17820 kHz.
Sun 1300-1559 on only two — 13650, 17800 kHz.

Frequencies

0500-0600	Anguilla,Caribbean Beacon	6090am			
0500-0600 vl	Australia, ABC/Katherine	5025do			
0500-0600 vl	Australia, ABC/Tent Creek	4910do			
0500-0600	Australia, Radio	9660pa	12080as	15240pa	15510pa
		17715pa	21820pa		
0500-0600 vl	Botswana, Radio	4820do	7255do		
0500-0600	Canada, CBC N Quebec Svc	9625do			
0500-0600	Canada, CFRX Toronto	6070do			
0500-0600	Canada, CFVP Calgary	6030do			
0500-0600	Canada, CHNX Halifax	6130do			
0500-0600	Canada, CKZU Vancouver	6160do			
0500-0529	Canada, R Canada Intl	5995na	9755na	11830na	
0500-0600	China, China Radio Intl	9560na			
0500-0600	Costa Rica,RF Peace Intl	6975am			
0500-0600	Cuba, Radio Havana	9550na	9820na	9830na	
0500-0600	Ecuador, HCJB	9745na	12015na	21455va	
0500-0545	Germany, Deutsche Welle	9615am	9670na	11795na	11810na
0500-0600	Guyana, GBC/Voice of	3290al	5950do		
0500-0600 as/vl	Italy, IRRS	3985va			
0500-0600	Japan, Radio/NHK	6110na	7230eu	9835na	11715as
		11760as	11840as	11850pa	15230pa
		15310sa	15590as		
0500-0600	Kenya, Kenya BC Corp	4885do	4935do		
0500-0600 vl	Lesotho, Radio	4800do			
0500-0600	Liberia,LCN/R Liberia Int	5100do			
0500-0510 vl/m-f	Malawi, MBC	5993do			
0500-0600	Malaysia, Radio	7295do			
0500-0600	Malaysia, RTM Sarawak	7160do			
0500-0600	Malaysia, Voice of	6175as	9750as	15295au	
0500-0600 vl	Namibia, NBC	3270af	3289af		
0500-0525	Netherlands, Radio	6165na	9590na		
0500-0600	New Zealand, R NZ Intl	17675pa			
0500-0600 vl	Nigeria, Radio/Ibadan	6050do			
0500-0600 vl	Nigeria, Radio/Kaduna	4770do			
0500-0600	Nigeria, Radio/Lagos	3326do			
0500-0600	Nigeria, Voice of	7255af	15120va		
0500-0600	North Korea, R Pyongyang	3560as	11710eu	13790as	
0500-0600 vl	Papua New Guinea, NBC	9675do			
0500-0600	Russia,Voice of Russia WS	15460au	15525au	17570au	17665au
		21790au			
0500-0530	S Africa, AWR Africa	5960af			
0500-0530	S Africa, Channel Africa	15215af			
0500-0600	Singapore,RCorp Singapore	6150do			
0500-0600 vl	Solomon Islands, SIBC	5020do			
0500-0600	Spain, R Exterior Espana	6055am			
0500-0505	Swaziland, Trans World R	4775af	6100af		
0500-0600	Uganda, Radio	4976do			
0500-0600	UK, BBC World Service	3255af	3955eu	5975am	6005af
	6175am 6180eu	6190af	6195eu	7160af	9410eu
	9740as 11760me	11765af	11955pa	12095pa	15280as
	15310as 15360as	15420af	15475af	15575as	17640af
	17760as 17885af	21660as			
0500-0600	UK, Merlin Network One	6010eu			
0500-0600	USA, KAIJ Dallas TX	5810na	9815al		
0500-0600	USA, KTBN Salt Lk City UT	7510na			
0500-0600	USA, KWHR Naalehu HI	17780as			
0500-0600	USA, Voice of America	5970af	6035af	6080af	7170af
		7295af	9700af	9775af	11825af
		12080af	15205me		
0500-0600	USA, WBCQ Monticello ME	7415na			
0500-0600	USA, WEWN Birmingham AL	5825va			
0500-0600	USA, WGTG McCaysville GA	3270na	5085am		
0500-0600	USA, WHRA Greenbush ME	7435af			
0500-0600	USA, WHRI Noblesville IN	5745na	7315sa		
0500-0600	USA, WINB Red Lion PA	11950ca			
0500-0600	USA, WJCR Upton KY	7490na	13595as		
0500-0600	USA, WRNO New Orleans LA	7395na			
0500-0600	USA, WSHB Cypress Crk SC	9840af	11930eu		
0500-0600	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0500-0600	USA, WYFR Okeechobee FL	5985na	9985eu	11580eu	
0500-0520	Vatican State, Vatican R	4005eu	5883eu	7250eu	
0500-0530	Vatican State, Vatican R	7360af	9660af	11625af	
0500-0600	Zambia, Christian Voice	3330af	6065af		
0500-0600	Zambia, Natl BC Corp	6165do	6265do		
0500-0530 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0505-0600	Swaziland, Trans World R	4775af	6100af	9500af	
0530-0600	Austria, R Austria Intl	6015na			
0530-0600 vl	Ghana, Ghana BC Corp	3366do	4915do		
0530-0600 mtwhfa	Malta, VO Mediterranean	7155eu			
0530-0600	Switzerland, Swiss R Intl	13635eu			
0530-0600	Thailand, Radio	9655eu	11905eu	15115eu	
0530-0600	UAE, Radio Dubai	15435au	17830au	21605au	21700au
0530-0600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		

Selected Programs

Sundays

0500 Costa Rica, R Peace Intl: RadioNation. Journalist Marc Cooper with a review of news, politics and culture from The Nation Magazine.
0500 Ecuador, HCJB Quito (am): Saludos Amigos. See S 0030.
0530 Ecuador, HCJB Quito (am): Afterglow. Don Johnson plays religious music.

Mondays

0500 Ecuador, HCJB Quito (am): Radio Reading Room. See M 0200.
0505 Costa Rica, R Peace Intl: Spiritual Awakening. Readings and book reviews on a broad range of spiritually-oriented writings from around the world.
0530 Costa Rica, R Peace Intl: Peace Talks. A Costa Rican program that addresses issues such as drug abuse, economic problems, the UN, and other topics/
0530 Ecuador, HCJB Quito (am): The Sower. See M 0300.
0545 Ecuador, HCJB Quito (am): Science, Scripture and Salvation. Proving scientific principles with the Bible.

Tuesdays

0500 Costa Rica, R Peace Intl: Millennium Dreams. See S 0400.
0500 Ecuador, HCJB Quito (am): Simply Worship. See S 1400.
0530 Costa Rica, R Peace Intl: UN Caribbean Echo. Produced for the Caribbean with news about United Nations activities in the area and internationally .
0530 Ecuador, HCJB Quito (am): Let My People Think. See S 1530.
0545 Costa Rica, R Peace Intl: UN Daily News. See M 2345.

Wednesdays

0500 Costa Rica, R Peace Intl: Living Enrichment Center. See M 0620.
0500 Ecuador, HCJB Quito (am): The Book and the Spade. See W 0200.
0515 Ecuador, HCJB Quito (am): Words for Women. See W 0215.
0530 Costa Rica, R Peace Intl: UNESCO. A feature program of the United Nations focusing on world educational, scientific, or cultural matters.
0530 Ecuador, HCJB Quito (am): Unshackled. See W 0230.
0545 Costa Rica, R Peace Intl: UN Daily News. See M 2345.

Thursdays

0500 Costa Rica, R Peace Intl: Deep Ecology for the 21st Century. See H 0430.
0500 Ecuador, HCJB Quito (am): Rock Solid! See H 0200.
0530 UK, BBC London (AE/AS): Blues World. Tony Russell presents the best of the recent releases in the world of the blues.
0545 Costa Rica, R Peace Intl: UN Daily News. See M 2345.

Fridays

0500 Costa Rica, R Peace Intl: ABS Radio. See F 0430.
0500 Ecuador, HCJB Quito (am): Radio Reading Room. See M 0200.
0530 Costa Rica, R Peace Intl: Tropical Conservation Newsbureau Report. See T 0244.
0530 Ecuador, HCJB Quito (am): Inspirational Classics. See F 0230.
0545 Costa Rica, R Peace Intl: UN Daily News. See M 2345.

Saturdays

0500 Costa Rica, R Peace Intl: Bruderhof Radio. Interviews.
0500 Ecuador, HCJB Quito (am): Inside HCJB. See A 0200.
0530 Costa Rica, R Peace Intl: The Tico Times Report. See M 2330.
0530 Ecuador, HCJB Quito (am): Walkin' in the Sunshine. See A 0230.
0540 Costa Rica, R Peace Intl: The Neumaier Report. See M 2330.
0545 Costa Rica, R Peace Intl: UN Daily News. See M 2345.

SWL Programs, continued from page 41

1230 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
1147 Radio Bulgaria: "Radio Bulgaria Calling"
1336 Voice of America (News Now): "Communications World" (B)
1342 Radio Tashkent: "Radio Tashkent DX Program"
1245 Voice of Turkey: "DX Corner" (biweekly)
1455 FEBC (Philippines): "DX Dial"
1536 Voice of America (News Now): "Communications World" (C)
1515 WWCR #1 (Tennessee): "Ask WWCR" (8th,22nd)
1700 World Radio Network (WRN1): "World of Radio"
1730 Radio For Peace Intl: "Continent of Media"
1730 BBC (am/eu): "Write On"
1730 BBC (am/eu): "Waveguide" (22nd)
1736 Voice of America (News Now): "Communications World" (A)
1800 Radio For Peace Intl: "World of Radio"
1909 HCJB (eu): "DX Partyline"
1936 Voice of America (News Now): "Communications World" (C)
1936 Voice of America (News Now): "Communications World" (C)
1958 Vatican Radio: "On-the-Air"
1915 Voice of Turkey: "DX Corner" (biweekly)
2114 Radio Havana Cuba: "DXers Unlimited"
2136 Voice of America (News Now): "Communications World" (B)
2231 Radio Exterior de Espana: "Radio Waves"
2147 Radio Bulgaria: "Radio Bulgaria Calling"
2300 Vatican Radio: "On-the-Air"
2306 Radio Havana Cuba: "DXers Unlimited"
2223 Voice of Turkey: "DX Corner" (biweekly)
2330 WHRA (Angel 5 Maine): "DXing with Cumbre"
2330 WHRI (Angel 1 Indiana): "DXing with Cumbre"

Frequencies

0600-0700	Anguilla,Caribbean Beacon	6090am				
0600-0700 vl	Australia, ABC/Katherine	5025do				
0600-0700 vl	Australia, ABC/Tent Creek	4910do				
0600-0700	Australia, Radio	9660pa	12080as	15240pa	15415as	
		15510pa	17715pa	17750as	21725pa	
0600-0700 vl	Botswana, Radio	4820do	4830do	7255do		
0600-0700 vl	Canada, CBC N Quebec Svc	9625do				
0600-0700	Canada, CFRX Toronto	6070do				
0600-0700	Canada, CFVP Calgary	6030do				
0600-0700	Canada, CHNX Halifax	6130do				
0600-0700	Canada, CKZU Vancouver	6160do				
0600-0629 mtwhf	Canada, R Canada Intl	6090va	6150va	9670af	9780va	
		11905va				
0600-0700	Costa Rica,RF Peace Intl	6975am				
0600-0700	Cuba, Radio Havana	9550na	9820na	9830na		
0600-0700	Ecuador, HCJB	9745na	12015na	21455va		
0600-0645	Germany, Deutsche Welle	6140eu	11915af	13790af	15185af	
		17820as	17860af	21680me		
0600-0700	Germany, Sunrise Radio	5850eu				
0600-0700	Germany,Overcomer Ministr	13810au				
0600-0700 vl	Ghana, Ghana BC Corp	3366do	4915do			
0600-0700	Guyana, GBC/Voice of	3290al	5950do			
0600-0630 vl	Italy, IRRS	3985va				
0600-0700	Japan, Radio/NHK	5975eu	7230eu	9835na	11740as	
		11840as	11850pa	15310sa	15590as	
0600-0700	Kenya, Kenya BC Corp	4885do	4935do			
0600-0700 vl	Lesotho, Radio	4800do				
0600-0700	Liberia,LCN/R Liberia Int	5100do				
0600-0700	Malaysia, Radio	7295do				
0600-0700	Malaysia, RTM Sarawak	7160do				
0600-0700	Malaysia, Voice of	6175as	9750as	15295au		
0600-0700 vl	Namibia, NBC	3270af	3289af			
0600-0700	New Zealand, R NZ Intl	17675pa				
0600-0700 vl	Nigeria, Radio/Ibadan	6050do				
0600-0700 vl	Nigeria, Radio/Kaduna	4770do				
0600-0700	Nigeria, Radio/Lagos	3326do				
0600-0700	Nigeria, Voice of	7255af	15120va			
0600-0700 vl	Papua New Guinea, NBC	9675do				
0600-0700	Romania, R Romania Intl	7105eu	9510na	9625eu	11775eu	
		17790af	21480na			
0600-0700	Russia,Voice of Russia WS	15460au	15525au	17495au	17570au	
		17665au	21790au			
0600-0630	S Africa, Channel Africa	15215af				
0600-0700	Sierra Leone, SLBS	3316do				
0600-0700	Singapore,RCorp Singapore	6150do				
0600-0700 vl	Solomon Islands, SIBC	5020do				
0600-0700	Swaziland, Trans World R	4775af	6100af	9500af		
0600-0700	UK, BBC World Service	5975am	6005af	6175am	6180eu	
		6190af	6195eu	7145pa	7160af	
		7325eu	9410eu	9740as	11760me	
		11765af	11940af	11955pa	12095eu	
		15310as	15360as	15400af	15420af	
		15565eu	15575as	17640af	17760as	
		17790as	17885af	21660as		
0600-0700	UK, Merlin Network One	6110eu	13720as			
0600-0700	USA, KAIJ Dallas TX	5810na	9815al			
0600-0700	USA, KTBN Salt Lk City UT	7510na				
0600-0700	USA, KWHR Naalehu HI	11565pa	17780as			
0600-0630	USA, Voice of America	5970af	5995af	6035af	6080af	
		7170af	7285af	11805af	11825eu	
		11905af	12080af	15205me	15600af	
0600-0700	USA, WBCQ Monticello ME	7415na				
0600-0700	USA, WEWN Birmingham AL	5825va				
0600-0700	USA, WHRA Greenbush ME	7435af				
0600-0700	USA, WHRI Noblesville IN	5745na	7315sa			
0600-0700	USA, WINB Red Lion PA	11950ca				
0600-0700	USA, WJCR Upton KY	7490na	13595as			
0600-0700	USA, WRNO New Orleans LA	7395na				
0600-0700	USA, WSHB Cypress Crk SC	13650af				
0600-0700	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na	
0600-0700	USA, WYFR Okeechobee FL	5985na	7355eu			
0600-0700 vl	Vanuatu, Radio	4960do				
0600-0700	Yemen, Rep of Yemen Radio	9780do				
0600-0700	Zambia, Christian Voice	3330af	6065af			
0600-0700	Zambia, Natl BC Corp	6165do	6265do			
0600-0700 vl	Zimbabwe, Zimbabwe BC	4828do	5012do			
0610-0615 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			
0630-0700	Austria, R Austria Intl	6015na				
0630-0700	Georgia, Georgian Radio	11910eu				
0630-0700 as	Italy, IRRS	7120va				
0630-0700 as	UK, BBC World Service	17885af				
0630-0700	USA, Voice of America	5995af	7170af	11825eu	11950af	
		15205me				
0630-0700 as	USA, Voice of America	5970af	6035af	6080af	7285af	
		11805af	12080af	15600af		
0630-0700	Vatican State, Vatican R	9660af	11625af	13765af		
0641-0656	Romania, R Romania Intl	9550eu	9625eu	9665eu	11885eu	
0645-0700	Germany, Deutsche Welle	6140eu				
0645-0655 as	Monaco, Trans World Radio	9870eu				
0655-0700 mtwhf	Monaco, Trans World Radio	9870eu				

Selected Programs

Sundays

0600 Costa Rica, R Peace Intl: Disability Radio Worldwide. Jean Parker with issues, events, political analysis and interviews.

0600 Ecuador, HCJB Quito (am): Solstice. See S 0200.

0600 UK, BBC London (AF/AS): The 1999 Reith Lectures - Runaway World (2nd,9th). This broadcast is a first for World Service and the theme is globalization.

0630 Costa Rica, R Peace Intl: WINGS. Women's news and current affairs by the Women's International News Gathering Service.

Mondays

0600 Ecuador, HCJB Quito (am): Mountain Meditations. See S 1330.

0615 UK, BBC London (AE): NEW! Talking Point (repeat). See S 1405.

0620 Costa Rica, R Peace Intl: Living Enrichment Center. Mary Mannin Morrissey lectures on practical suggestions for everyday living.

0630 Ecuador, HCJB Quito (am): Words to Live By. See S 1230.

Tuesdays

0600 Costa Rica, R Peace Intl: Beyond Growth. Policies and institutions for sustainability.

0600 Ecuador, HCJB Quito (am): Psychology for Living. Clyde Narramore of California gives Christian advice on issues of today.

0615 Ecuador, HCJB Quito (am): Stories of Great Christians. Radio drama with Christian theme from the Moody Bible Institute.

0630 Costa Rica, R Peace Intl: New Dimensions Radio. See M 2300.

0630 Ecuador, HCJB Quito (am): Nightsounds. Christian music and thoughtful words from Bill Pearce.

Wednesdays

0600 Costa Rica, R Peace Intl: WINGS. See S 0630.

0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.

0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.

0630 Costa Rica, R Peace Intl: Voices of Our World. See M 0430.

0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.

Thursdays

0600 Costa Rica, R Peace Intl: Global Community Forum/Far Right Radio Review. See M 1420.

0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.

0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.

0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.

Fridays

0600 Costa Rica, R Peace Intl: Indigenous Voices. See T 0330.

0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.

0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.

0630 Costa Rica, R Peace Intl: This Way Out. See S 1500.

0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.

Saturdays

0600 Costa Rica, R Peace Intl: Second Opinion. See S 0100.

0600 Ecuador, HCJB Quito (am): Psychology for Living. See T 0600.

0615 Ecuador, HCJB Quito (am): Stories of Great Christians. See T 0615.

0630 Costa Rica, R Peace Intl: Steppin' Out of Babylon. See T 1400.

0630 Ecuador, HCJB Quito (am): Nightsounds. See T 0630.

Enjoy *Monitoring Times* and appreciate all the good info (& especially the Shortwave Guide). Many thanks for a fine magazine.

–Betty Lucas

FREQUENCIES

0700-0800	Anguilla,Caribbean Beacon	6090am			
0700-0800 vl	Australia, ABC/Katherine	5025do			
0700-0800 vl	Australia, ABC/Tent Creek	4910do			
0700-0800	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
0700-0726	Belgium,R Vlaanderen Intl	9925eu	15195eu		
0700-0800 vl	Botswana, Radio	4820do	4830do	7255do	
0700-0800	Canada, CFRX Toronto	6070do			
0700-0800	Canada, CFVP Calgary	6030do			
0700-0800	Canada, CHNX Halifax	6130do			
0700-0800	Canada, CKZU Vancouver	6160do			
0700-0800	Costa Rica,RF Peace Intl	6975am			
0700-0727	Czech Rep, R Prague Intl	9880eu	11600eu		
0700-0800	Ecuador, HCJB	11855eu	15115pa	21455va	
0700-0800 as/vl	Eqt Guinea, R East Africa	15186af			
0700-0800 mtwhf	Eqt Guinea, Radio Africa	15186af			
0700-0800	Germany, Deutsche Welle	6140eu			
0700-0800	Germany, Sunrise Radio	5850eu			
0700-0800	Germany, Voice of Hope	5975eu			
0700-0800 s	Germany,Good News World R	13740as			
0700-0800	Germany,Overcomer Ministr	13810au			
0700-0800 vl	Ghana, Ghana BC Corp	3366do	4915do		
0700-0715 f	Greece, Voice of 7430eu	7450eu	9375eu	9420eu	9775au
0700-0800	Guyana, GBC/Voice of	3290al	5950do		
0700-0800 as	Italy, IRRS	7120va			
0700-0800	Kenya, Kenya BC Corp	4885do	4935do		
0700-0800 vl	Lesotho, Radio	4800do			
0700-0715	Liberia,LCN/R Liberia Int	5100do			
0700-0800	Malaysia, Radio	7295do			
0700-0800	Malaysia, RTM Sarawak	7160do			
0700-0800	Malaysia, Voice of	6175as	9750as	15295au	
0700-0800	Monaco, Trans World Radio	9870eu			
0700-0800	Myanmar, Radio	9730do			
0700-0715 vl	Namibia, NBC	3270af	3289af		
0700-0705	New Zealand, R NZ Intl	17675pa			
0700-0800 vl	Nigeria, Radio/Ibadan	6050do			
0700-0800 vl	Nigeria, Radio/Kaduna	4770do			
0700-0800 vl	Nigeria, Voice of	7255af	15120va		
0700-0800	Palau, KHBN/Voice of Hope	9965as	9985as	13840as	15725as
0700-0730 vl	Papua New Guinea, NBC	9675do			
0700-0800	Romania, R Romania Intl	17735af	21480af		
0700-0800	Russia,Voice of Russia WS	9905au	15525au	17495au	17665au
		21790au			
0700-0800	Sierra Leone, SLBS	3316do			
0700-0800	Singapore,RCorp Singapore	6150do			
0700-0730	Slovakia, R Slovakia Intl	9440au	15460au	17550au	
0700-0800 vl	Solomon Islands, SIBC	5020do			
0700-0705	Swaziland, Trans World R	4775af	6100af	9500af	
0700-0800	Taiwan, Radio Taipei Intl	5950na			
0700-0800	UK, BBC World Service	5975am	6005af	6175am	6190af
	7145af 7325eu	9410eu	9740as	11760me	11765af
	11835af 11940af	11955pa	12095eu	15310as	15360as
	15400af 15485eu	15565eu	15575as	17640eu	17760as
	17790as 17830af	21660as			
0700-0715 as	UK, BBC World Service	17885af			
0700-0800	UK, Merlin Network One	6110eu	9915eu	13720as	17630eu
		21550af			
0700-0800	USA, KAIJ Dallas TX	5810na	9815al		
0700-0800	USA, KTBN Salt Lk City UT	7510na			
0700-0800	USA, KWHR Naalehu HI	11565pa	17780as		
0700-0800	USA, WEWN Birmingham AL	5825va			
0700-0800	USA, WHRA Greenbush ME	7435af			
0700-0800	USA, WHRI Noblesville IN	5745na	7315sa		
0700-0800	USA, WJCR Upton KY	7490na	13595as		
0700-0800	USA, WRNO New Orleans LA	7395na			
0700-0800	USA, WSHB Cypress Crk SC	13650af			
0700-0800	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0700-0745	USA, WYFR Okeechobee FL	7355eu	9985eu	13695va	
0700-0800 vl	Vanuatu, Radio	4960do			
0700-0800	Zambia, Christian Voice	6065af			
0700-0800	Zambia, Natl BC Corp	6165do	6265do		
0700-0800 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0705-0710 mtwhf	Croatia, Croatian Radio	9830eu	13820af		
0705-0720 mtwhfa	Swaziland, Trans World R	4775af	6100af	9500af	
0706-0800	New Zealand, R NZ Intl	9700pa			
0715-0800 vl	Namibia, NBC	6060af	6175af		
0720-0730 mtwhf	Swaziland, Trans World R	4775af	6100af	9500af	
0730-0800	Austria, R Austria Intl	6155eu	13730eu	15410eu	17870eu
0730-0740	Greece, Voice of 7430eu	7450eu	9375eu	9420na	9775au
0730-0800 vl	Papua New Guinea, NBC	4890do			
0730-0735 mtwhf	Swaziland, Trans World R	4775af			
0730-0800	Switzerland, Swiss R Intl	15545af	17685af	21750af	
0730-0745 m-f/vl	Vatican State, Vatican R	4005eu	5883eu	6185eu	7250eu
		9645eu	11740eu	15595eu	
0740-0800 as	Guam, TWR/KTWR	15200as			
0745-0800 s	Albania, Trans World R	9685eu			
0800-0900	Albania, Trans World R	9685eu			
0800-0900	Anguilla,Caribbean Beacon	6090am			
0800-0830 vl	Australia, ABC/Katherine	5025do			
0800-0830 vl	Australia, ABC/Tent Creek	4910do			
0800-0900	Australia, Radio	5995pa	9580pa	9710pa	12080as
		15510pa	21725pa		
0800-0900 vl	Botswana, Radio	4820do	4830do	7255do	
0800-0900 vl	Canada, CBC N Quebec Svc	9625do			
0800-0900	Canada, CFRX Toronto	6070do			
0800-0900	Canada, CFVP Calgary	6030do			
0800-0900	Canada, CHNX Halifax	6130do			
0800-0900	Canada, CKZU Vancouver	6160do			
0800-0900	Costa Rica,RF Peace Intl	6975am			
0800-0900	Ecuador, HCJB	11855eu	15115pa	21455va	
0800-0900 as/vl	Eqt Guinea, R East Africa	15186af			
0800-0900 mtwhf	Eqt Guinea, Radio Africa	15186af			
0800-0900	Germany, Deutsche Welle	6140eu			
0800-0900	Germany, Sunrise Radio	5850eu			
0800-0900	Germany, Voice of Hope	5975eu			
0800-0900	Germany,Overcomer Ministr	13810au			
0800-0900	Guam, TWR/KTWR	15200as	15330as		
0800-0900	Guyana, GBC/Voice of	3290al	5950do		
0800-0900	Indonesia, Voice of	9525as	11765as	15510as	
0800-0900 as/vl	Italy, IRRS	7120va			
0800-0900	Kenya, Kenya BC Corp	4885do	4935do		
0800-0900 vl	Lesotho, Radio	4800do			
0800-0900	Liberia,LCN/R Liberia Int	5100do			
0800-0900	Malaysia, Radio	7295do			
0800-0830	Malaysia, Voice of	6175as	9750as	15295au	
0800-0900 vl	Malaysia,RTM KotaKinabalu	5980do			
0800-0900 s	Malta, VO Mediterranean	11770eu	11830eu		
0800-0850 s	Monaco, Trans World Radio	9870eu			
0800-0830	Myanmar, Radio	9730do			
0800-0900	N Marianas, KFBS Saipan	11650as	15380as		
0800-0900 vl	Namibia, NBC	6060af	6175af		
0800-0900	New Zealand, R NZ Intl	9700pa			
0800-0900 vl	Nigeria, Radio/Ibadan	6050do			
0800-0900 vl	Nigeria, Radio/Kaduna	4770do			
0800-0900	Nigeria, Radio/Lagos	3326do			
0800-0820 vl	Pakistan, Radio	15527eu	17835eu		
0800-0900	Palau, KHBN/Voice of Hope	9955as	9985as	13840va	15725as
0800-0900 vl	Papua New Guinea, NBC	4890do			
0800-0900	Russia,Voice of Russia WS	9905au	15525au	17495au	17655au
0800-0900 f	Seychelles, FEBA Radio	15540as			
0800-0900	Sierra, Leone,SLBS	5980do			
0800-0900	Singapore,RCorp Singapore	6150do			
0800-0900	South Korea, R Korea Intl	9570au	13670eu		
0800-0900	UK, BBC World Service	6190af	9410eu	9740as	11940af
		11955pa	12095eu	15310as	15360as
		15400af	15485eu	15565eu	17640eu
		17760as	17790as	17830af	21660as
0800-0900 as	UK, BBC World Service	15575as	17885af		
0800-0900	UK, Merlin Network One	9915eu	13660eu	13720as	17630eu
		21550af			
0800-0900	USA, KAIJ Dallas TX	5810na	9815al		
0800-0900	USA, KNLS Anchor Point AK	9615as			
0800-0900	USA, KTBN Salt Lk City UT	7510na			
0800-0900	USA, KWHR Naalehu HI	11565pa	17780as		
0800-0900	USA, WEWN Birmingham AL	5825va			
0800-0900	USA, WHRI Noblesville IN	5745na	7315sa		
0800-0900	USA, WJCR Upton KY	7490na	13595as		
0800-0900	USA, WRNO New Orleans LA	7395na			
0800-0900	USA, WSHB Cypress Crk SC	9845pa	9860eu		
0800-0900	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0800-0900 vl	Vanuatu, Radio	4960do			
0800-0900	Zambia, Christian Voice	6065af			
0800-0900	Zambia, Natl BC Corp	6165do	6265do		
0800-0900 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0805-0810 s	Croatia, Croatian Radio	9830eu	13820au		
0820-0830 t	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0830-0900 vl	Australia, ABC/Alice Spgs	2310do			
0830-0900 vl	Australia, ABC/Katherine	2485do			
0830-0900 vl	Australia, ABC/Tent Creek	2325do			
0830-0900	Austria, R Austria Intl	21650as	21765as		
0830-0900	Georgia, Georgian Radio	11910eu			
0830-0900	Lithuania, Radio Vilnius	9710eu			
0830-0900 vl	Solomon Islands, SIBC	5020do			
0830-0900	Switzerland, Swiss R Intl	9885as	13685as		
0845-0900 mtwhf	USA, WRMI/R Miami Intl	9955am			

Frequencies

0900-0920	Albania, Trans World R	9685eu			
0900-1000	Anguilla,Caribbean Beacon	6090am			
0900-1000 vl	Australia, ABC/Alice Spgs	2310do			
0900-1000 vl	Australia, ABC/Katherine	2485do			
0900-1000 vl	Australia, ABC/Tent Creek	2325do			
0900-1000	Australia, Radio	6080as	9580pa	11880as	17750as
0900-0910 s	Bhutan, Bhutan BC Service	6030do			
0900-1000 vl	Botswana, Radio	4820do	4830do	7255do	
0900-1000	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZU Vancouver	6160do			
0900-0956	China, China Radio Intl	15210pa	17755pa		
0900-1000	Costa Rica,RF Peace Intl	6975am			
0900-0929	Czech Rep, R Prague Intl	21745va			
0900-1000	Ecuador, HCJB	15115pa	21455va		
0900-1000 as/vl	Eqt Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eqt Guinea, Radio Africa	15186af			
0900-0945	Germany, Deutsche Welle	6140eu	6160pa	9565af	15210af
		15410af	17560as	17800af	21680as
		21790af			
0900-1000	Germany, Sunrise Radio	5850eu			
0900-1000	Germany, Voice of Hope	5975eu			
0900-1000	Germany,Overcomer Ministr	13810au			
0900-1000 vl	Ghana, Ghana BC Corp	4915do	6130do		
0900-0915	Guam, TWR/KTWR	15200as	15330as		
0900-1000	Guyana, GBC/Voice of	3290al	5950do		
0900-1000 as/vl	Italy, IRRS	7120va			
0900-1000	Kenya, Kenya BC Corp	4935do			
0900-1000 vl	Lesotho, Radio	4800do			
0900-0915	Liberia,LCN/R Liberia Int	5100do			
0900-1000	Malaysia, Radio	7295do			
0900-1000 vl	Malaysia,RTM KotaKinabalu	5980do			
0900-0930 s	Malta, VO Mediterranean	11770eu	11830eu		
0900-1000	N Marianas, KFBS Saipan	9495as	11650as	15380as	
0900-1000	N Marianas, KHBI Saipan	11660as	15665as		
0900-1000 vl	Namibia, NBC	6060af	6175af		
0900-1000	New Zealand, R NZ Intl	9700pa			
0900-1000 vl	Nigeria, Radio/Ibadan	6050do			
0900-1000 vl	Nigeria, Radio/Kaduna	4770do			
0900-1000	Nigeria, Radio/Lagos	3326do			
0900-1000 vl	Pakistan, Radio	15527eu	17835eu		
0900-1000	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
0900-1000 vl	Papua New Guinea, NBC	4890do			
0900-1000	Sierra Leone, SLBS	5980do			
0900-1000	Singapore,RCorp Singapore	6150do			
0900-1000 vl	Solomon Islands, SIBC	5020do			
0900-1000	Tanzania, Radio	5050af			
0900-1000	UK, BBC World Service	6065as	6190af	6195as	9410eu
		9580as	9740as	11760me	11765pa
		11940af	11945as	11955as	12095eu
		15190sa	15310as	15360as	15400af
		15485eu	15565eu	15575as	17640eu
		17705eu	17760as	17790as	17830af
		17885af	21660as		
0900-1000	UK, Merlin Network One	9915eu	13660eu	17630eu	21550af
0900-1000	USA, KAIJ Dallas TX	5810na	9815al		
0900-1000	USA, KTBN Salt Lk City UT	7510na			
0900-1000	USA, KWHR Naalehu HI	11565pa	17780as		
0900-1000	USA, WEWN Birmingham AL	5825va			
0900-1000	USA, WHRI Noblesville IN	5745na	7315sa		
0900-1000	USA, WJCR Upton KY	7490na	13595as		
0900-1000	USA, WRNO New Orleans LA	7395na			
0900-1000	USA, WSHB Cypress Crk SC	9455sa	9860eu		
0900-1000	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0900-1000	Zambia, Christian Voice	6065af			
0900-1000	Zambia, Natl BC Corp	6165do	6265do		
0900-1000 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0905-0910 mtwhf	Croatia, Croatian Radio	13820af			
0915-0930	Guam, TWR/KTWR	15330as			
0920-0935 as	Albania, Trans World R	9685eu			
0930-1000	Canada, CKZN St John's	6160do			
0930-1000	Georgia, Georgian Radio	11910eu			
0930-1000 as	Guam, TWR/KTWR	9865as			
0930-1000	Italy, AWR Europe	7230eu			
0930-1000	Netherlands, Radio	7260as	9820au	12065as	
0930-1000	Philippines, FEBC R Intl	11635as			
0935-0950 s	Albania, Trans World R	9685eu			
0945-1000	Germany, Deutsche Welle	6140eu			
0950-0945 a	UK, BBC World Service	6095as	9580as	11945as	11955as
		15280as			

1000-1100	Anguilla,Caribbean Beacon	11775am			
1000-1030	Armenia, Voice of	4810eu	15270eu		
1000-1100 vl	Australia, ABC/Alice Spgs	2310do			
1000-1100 vl	Australia, ABC/Katherine	2485do			
1000-1100 vl	Australia, ABC/Tent Creek	2325do			
1000-1100	Australia, Radio	6080as	9580pa	11880as	17750as
1000-1100 vl	Botswana, Radio	4820do	4830do	7255do	
1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
1000-1100	Canada, CFRX Toronto	6070do			
1000-1100	Canada, CFVP Calgary	6030do			
1000-1100	Canada, CHNX Halifax	6130do			
1000-1100	Canada, CKZN St John's	6160do			
1000-1100	Canada, CKZU Vancouver	6160do			
1000-1056	China, China Radio Intl	15210pa	17755pa		
1000-1100	Costa Rica,RF Peace Intl	6975am			
1000-1100	Ecuador, HCJB	15115pa	21455va		
1000-1100 as/vl	Eqt Guinea, R East Africa	15186af			
1000-1100 mtwhf	Eqt Guinea, Radio Africa	15186af			
1000-1100	Germany, Deutsche Welle	6140eu			
1000-1100	Germany, Sunrise Radio	5850eu			
1000-1100	Germany, Voice of Hope	5975eu			
1000-1100 a	Germany,Good News World R	5910eu			
1000-1100 vl	Ghana, Ghana BC Corp	4915do	6130do		
1000-1030	Guam, AWR/KSDA	11560as			
1000-1100	Guam, TWR/KTWR	9865as			
1000-1100	Guyana, GBC/Voice of	3290al	5950do		
1000-1100	India, All India Radio	11585as	13700as	15040as	17387au 17840as
1000-1100 as/vl	Italy, IRRS	7120va			
1000-1100	Japan, Radio/NHK	9695as	11850pa	15590as	
1000-1100	Jordan, Radio	11690eu			
1000-1100	Kenya, Kenya BC Corp	4935do			
1000-1010 fa	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
1000-1100 vl	Lesotho, Radio	4800do			
1000-1100	Malaysia, Radio	7295do			
1000-1100 vl	Malaysia,RTM KotaKinabalu	5980do			
1000-1100	N Marianas, KFBS Saipan	9495as	11650as	15380as	
1000-1100	N Marianas, KHBI Saipan	11660as	15665as		
1000-1100 vl	Namibia, NBC	6060af	6175af		
1000-1100	Netherlands, Radio	7260as	9820au	12065as	
1000-1015	New Zealand, R NZ Intl	9700pa			
1000-1100 vl	Nigeria, Radio/Ibadan	6050do			
1000-1100 vl	Nigeria, Radio/Kaduna	4770do			
1000-1100 vl	Nigeria, Voice of	7255af	15120va		
1000-1100 vl	Pakistan, Radio	15527eu	17835eu		
1000-1100	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Philippines, FEBC R Intl	11635as			
1000-1100	Sierra Leone, SLBS	5980do			
1000-1030	Singapore, RTE Radio	11740as			
1000-1100	Singapore,RCorp Singapore	6150do			
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1030	Switzerland, Swiss R Intl	15315eu			
1000-1030	Tanzania, Radio	5050af			
1000-1100	UK, BBC World Service	5965am	6190af	6195va	9410eu
	9740as 11760me	11765pa	11940af	12095eu	15310as
	15360as 15485eu	15565eu	15575as	17640eu	17705eu
	17760as 17790as	17885af	21660as		
1000-1100 as	UK, BBC World Service	15190sa	15400af	17830af	
1000-1100	UK, Merlin Network One	9915eu	13660eu	17630eu	21550af
1000-1100	USA, KAIJ Dallas TX	5810na	9815al		
1000-1100	USA, KTBN Salt Lk City UT	7510na			
1000-1100	USA, KWHR Naalehu HI	9930as	11565pa	17780as	
1000-1100	USA, Voice of America	5985pa	6165ca	7405ca	9590ca
		11720as	15425as		
1000-1100	USA, WEWN Birmingham AL	7425na	15745eu		
1000-1100	USA, WHRI Noblesville IN	6040na	9495am		
1000-1100	USA, WJCR Upton KY	7490na	13595as		
1000-1100	USA, WRNO New Orleans LA	7395na			
1000-1100	USA, WSHB Cypress Crk SC	6095am	9455sa		
1000-1100	USA, WWCR Nashville TN	2390na	5070na	5935na	12160na
1000-1100	USA, WYFR Okeechobee FL	5950na			
1000-1025	Vietnam, Voice of	5940as	7270as	7400as	9840as
		12019as	15110as		
1000-1100	Zambia, Christian Voice	6065af			
1000-1100	Zambia, Natl BC Corp	6165do	6265do		
1000-1100 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1015-1100 occsnal	New Zealand, R NZ Intl	9700pa			
1015-1030 mtwhfa	Vatican State, Vatican R	5883eu	9645eu	11740eu	15595eu
		21850eu			
1030-1057	Czech Rep, R Prague Intl	9880eu	11615eu		
1030-1100	Ethiopia, Radio	5990do	7110do	9705do	
1030-1100	Guam, AWR/KSDA	11560as	11795as		
1030-1035	Israel, Kol Israel	15650va	17535va		
1030-1100	Malaysia, RTM Sarawak	7160do			
1030-1100 as	Tanzania, Radio	5050af			
1030-1100	UAE, Radio Dubai	13675eu	15370eu	15395eu	21605eu

Frequencies

1100-1200	Anguilla,Caribbean Beacon	11775am			
1100-1200 vl	Australia, ABC/Alice Spgs	2310do			
1100-1200 vl	Australia, ABC/Katherine	2485do			
1100-1200 vl	Australia, ABC/Tent Creek	2325do			
1100-1200	Australia, Radio	6080as	9580pa		
1100-1200 vl	Botswana, Radio	4820do	4830do	7255do	
1100-1200	Bulgaria, Radio	15700eu	17500eu		
1100-1200	Canada, CFRX Toronto	6070do			
1100-1200	Canada, CFVP Calgary	6030do			
1100-1200	Canada, CHNX Halifax	6130do			
1100-1200	Canada, CKZN St John's	6160do			
1100-1200	Canada, CKZU Vancouver	6160do			
1100-1200	Costa Rica,RF Peace Intl	6975am			
1100-1200	Ecuador, HCJB	12005ca	15115am	21455va	
1100-1200 as/vl	Eqt Guinea, R East Africa	15186af			
1100-1157	France, R France Intl	9805eu			
1100-1145	Germany, Deutsche Welle	6140eu	15370af	15410af	17680af
1100-1200	Germany, Sunrise Radio	5850eu			
1100-1200 vl	Ghana, Ghana BC Corp	4915do	6130do		
1100-1200	Guyana, GBC/Voice of	3290al	5950do		
1100-1200	Iran, VOIRI	11830as	11875as	13605as	15255as
		17560as			
1100-1200 as/vl	Italy, IRRS	7120va			
1100-1200	Japan, Radio/NHK	6120na	9695as	15590as	
1100-1200	Jordan, Radio	11690eu			
1100-1120 fa	Kazakhstan, R Almaty Intl	9620eu	11840as		
1100-1200	Kenya, Kenya BC Corp	4935do			
1100-1130 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
1100-1200 vl	Lesotho, Radio	4800do			
1100-1110	Liberia,LCN/R Liberia Int	5100do			
1100-1200	Malaysia, Radio	7295do			
1100-1200 vl	Malaysia,RTM KotaKinabalu	5980do			
1100-1200	N Marianas, KFBS Saipan	9495as	11650as	15380as	
1100-1200	N Marianas, KHBI Saipan	9355as			
1100-1200 vl	Namibia, NBC	6060af	6175af		
1100-1125	Netherlands, Radio	7260as	9820au	12065as	
1100-1200 occsnal	New Zealand, R NZ Intl	9700pa			
1100-1200 vl	Nigeria, Radio/Ibadan	6050do			
1100-1200 vl	Nigeria, Radio/Kaduna	4770do			
1100-1200 vl	Nigeria, Voice of	7255af	15120va		
1100-1200	North Korea, R Pyongyang	3560as	9640va	9850as	9975me
		11335am	13650va		
1100-1120 vl	Pakistan, Radio	15527eu	17835eu		
1100-1200	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
1100-1200 vl	Papua New Guinea, NBC	4890do			
1100-1200	Sierra Leone, SLBS	5980do			
1100-1200	Singapore,R Singapore Int	6015as	6150as		
1100-1130 vl	Solomon Islands, SIBC	5020do			
1100-1200	Switzerland, Swiss R Intl	13735as	21770as		
1100-1200	Taiwan, Voice of Asia	7445as			
1100-1200 as	Tanzania, Radio	5050af			
1100-1130 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1100-1200	UK, BBC World Service	5965am	6190af	6195va	9410eu
		9580as	9740as	11760me	11940af
		11955as	12095eu	15280as	15310as
		15400af	15485eu	15565eu	15575as
		17640eu	17705va	17790sa	17830af
		17885af	21660af		
1100-1130 as	UK, BBC World Service	15190sa	15220am		
1100-1200	UK, Merlin Network One	9915eu	13660eu	17650eu	21550af
1100-1200	Ukraine, R Ukraine Intl	17380na	21510as		
1100-1200	USA, KAIJ Dallas TX	5810na	9815al		
1100-1200	USA, KTBN Salt Lk City UT	7510na			
1100-1200	USA, KWHR Naalehu HI	9930as	11565pa	17780as	
1100-1200	USA, Voice of America	5985pa	6160as	9645as	9760as
		11705as	11720as	15425as	
1100-1130 mtwhf	USA, Voice of America	13675af	15510af	17650af	17750af
		21705af			
1100-1200	USA, WEWN Birmingham AL	7425na	15745eu		
1100-1200	USA, WHRI Noblesville IN	6040na	9495am		
1100-1200	USA, WJCR Upton KY	7490na	13595as		
1100-1200	USA, WRNO New Orleans LA	7395na			
1100-1200	USA, WSHB Cypress Crk SC	6095am	11600am		
1100-1200	USA, WWCR Nashville TN	5070na	5935na	7435na	12160na
1100-1200	USA, WYFR Okeechobee FL	5850na	5950na	6015na	
1100-1125	Vietnam, Voice of	7285as	9730as		
1100-1200	Zambia, Christian Voice	6065af			
1100-1200	Zambia, Natl BC Corp	6165do	6265do		
1100-1200 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1115-1145	Nepal, Radio	5005as	7165as		
1120-1140 w	Kazakhstan, R Almaty Intl	9620eu	11840as		
1120-1200 irreg	Saudi Arabia, BSKSA	21670as			
1130-1156	Belgium,R Vlaanderen Intl	5985eu			
1130-1200 vl	China, China Radio Intl	6995as	11700as		
1130-1200 vl	Libya, Voice of Africa	15235va	15415va	15435va	
1130-1200	Netherlands, Radio	6045eu	9855eu		
1130-1200	South Korea, R Korea Intl	9650am			
1130-1200	Sweden, Radio	18960na	21810na		
1130-1200 as	UK, BBC World Service	15310as			
1130-1200 f	Vatican State, Vatican R	15595va	17550va		
1140-1200 t	Kazakhstan, R Almaty Intl	9620eu	11840as		
1145-1200	Germany, Deutsche Welle	6140eu			

Selected Programs

Sundays

1100 Costa Rica, R Peace Intl: CounterSpin. See S 0300.
1100 Ecuador, HCJB Quito (am): Morning Song. Music and thoughts to start the day.
1130 Costa Rica, R Peace Intl: Making Contact. See S 0330.
1130 Ecuador, HCJB Quito (am): The Christian's Hour. Christian messages of inspiration by Gary York.

Mondays

1100 Costa Rica, R Peace Intl: Every Living Thing. See S 0000.
1100 Ecuador, HCJB Quito (am): Insight for Living. Chuck Swindoll applies the Bible to life today.
1128 Ecuador, HCJB Quito (am): Money Minute. See S 0000.
1130 Costa Rica, R Peace Intl: Wisdom Radio Presents. See M 0330.
1130 Ecuador, HCJB Quito (am): Morning in the Mountains. Shelly Sutton with a light-hearted mix of music, conversation and news helps you start your morning with a live program of music, news, scripture reading, and sports.
1131 Ecuador, HCJB Quito (am): Latin American News. Regional news summary.

Tuesdays

1100 Costa Rica, R Peace Intl: Disability Radio Worldwide. See S 0600.
1100 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
1128 Ecuador, HCJB Quito (am): Money Minute. See S 0000.
1130 Costa Rica, R Peace Intl: Indigenous Voices. See T 0330.
1130 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1131 Ecuador, HCJB Quito (am): Latin American News. See M 1131.
11400 Ecuador, HCJB Quito (am): Gateway to Joy. See M 1400.

Wednesdays

1100 Costa Rica, R Peace Intl: World of Radio. See S 0200.
1100 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
1128 Ecuador, HCJB Quito (am): Money Minute. See S 0000.
1130 Costa Rica, R Peace Intl: RFPI's Mailbag. See S 0230.
1130 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1131 Ecuador, HCJB Quito (am): Latin American News. See M 1131.

Thursdays

1100 Costa Rica, R Peace Intl: Every Living Thing. See S 0000.
1100 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
1128 Ecuador, HCJB Quito (am): Money Minute. See S 0000.
1130 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1131 Ecuador, HCJB Quito (am): Latin American News. See M 1131.

Fridays

1100 Costa Rica, R Peace Intl: Positive Living. See F 0300.
1100 Ecuador, HCJB Quito (am): Insight for Living. See M 1100.
1128 Ecuador, HCJB Quito (am): Money Minute. See S 0000.
1130 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1131 Ecuador, HCJB Quito (am): Latin American News. See M 1131.
1145 UK, BBC London (AS): To Boldly Go. See F 1545.

Saturdays

1100 Costa Rica, R Peace Intl: Continent of Media. See S 0130.
1100 Ecuador, HCJB Quito (am): Your Story Hour. Dramatized children's stories.
1130 Costa Rica, R Peace Intl: World of Radio. See S 0200.
1130 Ecuador, HCJB Quito (am): We Kids. A fast-moving program for children.

Hauser's Highlights

SLOVAKIA: R. Slovakia International

A-99 English:

UTC	Target	kHz
0100-0130	North America	5930
	Central America	7300
	South America	9440
0700-0730	Australia	9440
	Australia	15460
	Australia	17550
1630-1700	Western Europe	5920
	Western Europe	6055
	Western Europe	7345
1830-1900	Western Europe	5920
	Western Europe	6055
	Western Europe	7345

Web **http://www.slovakradio.sk/rsi.html**
(Richard Buckby, rec.radio.shortwave via John Norfolk, OK)

Frequencies

1200-1300	Anguilla,Caribbean Beacon	11775am			
1200-1300 vl	Australia, ABC/Alice Spgs	2310do			
1200-1300 vl	Australia, ABC/Katherine	2485do			
1200-1300 vl	Australia, ABC/Tent Creek	2325do			
1200-1300	Australia, Radio	6020pa	6080as	9580pa	
1200-1300 vl	Botswana, Radio	4820do	4830do	7255do	
1200-1300	Brazil, R Nacional Bras	15445am			
1200-1215	Cambodia, Natl Radio Of	11940as			
1200-1300 vl	Canada, CBC N Quebec Svc	9625do			
1200-1300	Canada, CFRX Toronto	6070do			
1200-1300	Canada, CFVP Calgary	6030do			
1200-1300	Canada, CHNX Halifax	6130do			
1200-1300	Canada, CKZN St John's	6160do			
1200-1300	Canada, CKZU Vancouver	6160do			
1200-1229	Canada, R Canada Intl	6150as	11730as		
1200-1256	China, China Radio Intl	6950pa	6955as	7385pa	9565as
		9715as	11660as	11675pa	11980as
1200-1230 vl	China, China Radio Intl	6995as	11700as	12110as	
1200-1300	Ecuador, HCJB	12005ca	15115am	21455va	
1200-1300 as/vl	Eqt Guinea, R East Africa	15186af			
1200-1257	France, Radio France Intl	11600as	15155eu		
1200-1300	Germany, Deutsche Welle	6140eu			
1200-1300	Germany, Sunrise Radio	5850eu			
1200-1300 vl	Ghana, Ghana BC Corp	4915do			
1200-1300	Guyana, GBC/Voice of	3290al	5950do		
1200-1210	India, All India Radio	4760do			
1200-1230	Iran, VOIRI 11830as	11875as	13605as	15255as	17560as
1200-1300	Jordan, Radio	11690eu			
1200-1300	Kenya, Kenya BC Corp	4935do			
1200-1300 vl	Lesotho, Radio	4800do			
1200-1300	Malaysia, Radio	7295do			
1200-1300 vl	Malaysia,RTM KotaKinabalu	5980do			
1200-1300	N Marianas, KFBS Saipan	11650as	15380as		
1200-1300	N Marianas, KHBI Saipan	9355as			
1200-1300 vl	Namibia, NBC	6060af	6175af		
1200-1300	Netherlands, Radio	6045eu	9855eu		
1200-1205 occsnal	New Zealand, R NZ Intl	9700pa			
1200-1300 vl	Nigeria, Radio/Ibadan	6050do			
1200-1300 vl	Nigeria, Radio/Kaduna	4770do			
1200-1300	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
1200-1300 m-a/vl	Papua New Guinea, NBC	4890do			
1200-1255	Poland, Polish R Warsaw	6095eu	7270eu	9525eu	11820eu
1200-1300	Sierra Leone, SLBS	5980do			
1200-1300	Singapore,R Singapore Int	6015as	6150as		
1200-1230	Switzerland, Swiss R Intl	15315eu			
1200-1300	Taiwan, Radio Taipei Intl	7130as	9610au		
1200-1300 as	Tanzania, Radio	5050af			
1200-1300	UK, BBC World Service	5965am	6190af	6195va	9410eu
	9515am 9580as	9740as	11760me	11940af	11955as
	12095eu 15220am	15280as	15310as	15485eu	15565eu
	15575me 17640eu	17705va	17830af	17885af	21660af
1200-1300	UK, Merlin Network One	9915eu	13645eu	17650eu	21550af
1200-1300	USA, KAIJ Dallas TX	5810na	9815al		
1200-1300	USA, KTBN Salt Lk City UT	7510na			
1200-1300	USA, KWHR Naalehu HI	9930as	11565pa		
1200-1300	USA, Voice of America	6110as	9645as	9760as	11705as
		11715as	15425as		
1200-1300	USA, WEWN Birmingham AL	7425na	15745eu		
1200-1300	USA, WHRI Noblesville IN	6040na	9495am		
1200-1300	USA, WJCR Upton KY	7490na	13595as		
1200-1300 s	USA, WRMI/R Miami Intl	9955am			
1200-1300	USA, WRNO New Orleans LA	7395na			
1200-1300	USA, WSHB Cypress Crk SC	6095am			
1200-1300	USA, WWCR Nashville TN	5070na	7435na	13845na	15685na
1200-1245	USA, WYFR Okeechobee FL	5850eu	5950na	6015na	17750na
1200-1228	Uzbekistan, R Tashkent	5060as	5975as	6025as	9715as
1200-1300	Zambia, Christian Voice	6065af			
1200-1300	Zambia, Natl BC Corp	6165do	6265do		
1200-1300 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1204-1216 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1204-1216 as	UK, BBC World Service	15220am			
1206-1300 occsnal	New Zealand, R NZ Intl	6105pa			
1215-1300	Egypt, Radio Cairo	17595as			
1215-1230 irreg	Saudi Arabia, BSKSA	15435as			
1230-1300	Austria, R Austria Intl	6155eu	13730na		
1230-1300	Bangladesh, Bangla Betar	7185as	9548as		
1230-1300	Finland, YLE/R Finland	15400na	17670na		
1230-1300	Guam, AWR/KSDA	15330as			
1230-1300	Italy, AWR Europe	11800eu			
1230-1300	Mongolia, Voice of	12085au			
1230-1300	Serbia, Radio Yugoslavia	11835au			
1230-1300	South Korea, R Korea Intl	6055as	9570as	13670as	
1230-1300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1230-1300	Sweden, Radio	17895as	21810as		
1230-1300	Thailand, Radio	9655as	9810as	11905as	
1230-1300	Turkey, Voice of	15295as	17815as		
1230-1255	Vietnam, Voice of 5940as	7270as	7400as	9840as	12020as
1240-1250	Greece, Voice of	15630af			
1245-1300	USA, WYFR Okeechobee FL	5950na	17750na		

Selected Programs

Sundays

1200 Costa Rica, R Peace Intl: Millennium Dreams. See S 0400.
1200 Ecuador, HCJB Quito (am): Hour of Decision. Evangelist Billy Graham's radio program.
1200 France, R France Intl: News. World news and news about France.
1219 France, R France Intl: Asia File. Correspondent reports and interviews on Asian affairs.
1230 Ecuador, HCJB Quito (am): Words to Live By. What the Scriptures have to say when someone is disappointed with God.
1230 France, R France Intl: News Headlines. A summary of today's news.
1233 France, R France Intl: Club 9516. Listener letters are read in this mailbag program.

Mondays

1200 Costa Rica, R Peace Intl: Voices of Our World. See M 0430.
1200 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1200 France, R France Intl: News. See S 1200.
1225 France, R France Intl: Review of the French Newspapers. Highlights of articles from the French print media.
1230 France, R France Intl: News Headlines. See S 1230.
1231 France, R France Intl: Sports Magazine. A summary of the seasonal matches from around the continent.
1232 France, R France Intl: RFI Europe. European press review focuses on current affairs in other countries of the region.
1235 Costa Rica, R Peace Intl: Spiritual Awakening. See M 0505.
1241 France, R France Intl: News Summary. An update of today's news and sports.
1245 France, R France Intl: Arts in France. Profile on the work of a French artist or a cultural activity such as music.
1250 France, R France Intl: Insight. A report on a particular topic of worldwide concern.
1255 Ecuador, HCJB Quito (am): The Gospel Truth. Miles McKee.

Tuesdays

1200 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1200 France, R France Intl: News. See S 1200.
1226 France, R France Intl: Review of the French Newspapers. See M 1225.
1230 France, R France Intl: News Headlines. See S 1230.
1232 France, R France Intl: Books. New books, publishing trends, and authors.
1237 France, R France Intl: Discovery. A weekly feature about developments in the world of science and medicine.
1242 France, R France Intl: News Summary. See M 1241.
1246 France, R France Intl: Land of France. A feature on life and times in France.
1255 Ecuador, HCJB Quito (am): The Gospel Truth. See M 1255.

Wednesdays

1200 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1200 France, R France Intl: News. See S 1200.
1226 France, R France Intl: Review of the French Newspapers. See M 1225.
1230 France, R France Intl: News Headlines. See S 1230.
1232 France, R France Intl: France Today. Current happenings in France.
1234 France, R France Intl: Power and Policy. The French perspective on global politics.
1239 France, R France Intl: RFI Europe. See M 1232.
1244 France, R France Intl: News Summary. See M 1241.
1247 France, R France Intl: Letter from a Listener. See T 1645.
1250 France, R France Intl: Land of France. See T 1246.
1255 Ecuador, HCJB Quito (am): The Gospel Truth. See M 1255.

Thursdays

1200 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1200 France, R France Intl: News. See S 1200.
1226 France, R France Intl: Review of the French Newspapers. See M 1225.
1230 France, R France Intl: News Headlines. See S 1230.
1233 France, R France Intl: The Bottom Line. Focus on financial matters.
1239 France, R France Intl: Planet Earth (biweekly). An interview with an expert on ecological matters.
1244 France, R France Intl: News Summary. See M 1241.
1247 France, R France Intl: Letter from a Listener. See T 1645.
1250 France, R France Intl: North/South (biweekly). Focus on a public activity in France.
1255 Ecuador, HCJB Quito (am): The Gospel Truth. See M 1255.

Fridays

1200 Ecuador, HCJB Quito (am): Morning in the Mountains. See M 1130.
1200 France, R France Intl: News. See S 1200.
1226 France, R France Intl: Review of the French Newspapers. See M 1225.
1230 France, R France Intl: News Headlines. See S 1230.
1234 France, R France Intl: Weekend. Colleagues from BBC World Service, Radio France International and Deutsche Welle join for a weekly look at issues and themes important throughout Europe.
1255 Ecuador, HCJB Quito (am): The Gospel Truth. See M 1255.

Saturdays

1200 Ecuador, HCJB Quito (am): A Visit With Mrs. G. Bible stories for children.
1200 France, R France Intl: News. See S 1200.
1223 France, R France Intl: Focus on France. Zooming in on a French news item.
1226 France, R France Intl: Review of the French Newspapers. See M 1225.
1230 Ecuador, HCJB Quito (am): Adventures in Odyssey. See T 0130.
1231 France, R France Intl: Spotlight on Africa. Correspondent reports and interviews on African affairs.
1244 France, R France Intl: News Update. Headline news.
1246 France, R France Intl: French Lesson. Learn French by radio.
1251 France, R France Intl: Letter from a Listener. See T 1645.

Frequencies

1300-1400	Anguilla,Caribbean Beacon	11775am			
1300-1400 vl	Australia, ABC/Alice Spgs	2310do			
1300-1400 vl	Australia, ABC/Katherine	2485do			
1300-1400 vl	Australia, ABC/Tent Creek	2325do			
1300-1400	Australia, Radio	6020pa	6080as	9580pa	
1300-1400 vl	Botswana, Radio	4820do	4830do	7255do	
1300-1320	Brazil, R Nacional Bras	15445am			
1300-1400 vl	Canada, CBC N Quebec Svc	9625do			
1300-1400	Canada, CFRX Toronto	6070do			
1300-1400	Canada, CFVP Calgary	6030do			
1300-1400	Canada, CHNX Halifax	6130do			
1300-1400	Canada, CKZN St John's	6160do			
1300-1400	Canada, CKZU Vancouver	6160do			
1300-1330	Canada, R Canada Intl	9640am	13650am	17715am	
1300-1356	China, China Radio Intl	11660as	11675pa	11715pa	11980as
		15180as			
1300-1329	Czech Rep, R Prague Intl	13580eu	17485as		
1300-1400	Ecuador, HCJB	12005ca	15115am	21455va	
1300-1330	Egypt, Radio Cairo	17595as			
1300-1400 as/vl	Eqt Guinea, R East Africa	15186af			
1300-1329	Germany, Deutsche Welle	6140eu			
1300-1400	Germany, Sunrise Radio	5850eu			
1300-1400 a	Germany,Good News World R	15190as			
1300-1400 vl	Ghana, Ghana BC Corp	4915do	6130do		
1300-1400	Guyana, GBC/Voice of	3290al	5950do		
1300-1400	Jordan, Radio	11690eu			
1300-1400	Kenya, Kenya BC Corp	4935do			
1300-1400 vl	Lesotho, Radio	4800do			
1300-1310	Liberia,LCN/R Liberia Int	5100do			
1300-1400	Malaysia, Radio	7295do			
1300-1400 vl	Malaysia,RTM KotaKinabalu	5980do			
1300-1400	N Marianas, KFBS Saipan	9670as	11650as		
1300-1400	N Marianas, KHBI Saipan	9355as			
1300-1400 vl	Namibia, NBC	6060af	6175af		
1300-1325	Netherlands, Radio	6045eu	9855eu		
1300-1400 occsnal	New Zealand, R NZ Intl	6105pa			
1300-1400 vl	Nigeria, Radio/Ibadan	6050do			
1300-1400 vl	Nigeria, Radio/Kaduna	4770do			
1300-1400	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
1300-1400 vl	Papua New Guinea, NBC	4890do			
1300-1400	Romania, R Romania Intl	15335eu	17745na	17805eu	
1300-1400 as	S Africa, Channel Africa	11900af	17895af	21530af	
1300-1400	Sierra Leone, SLBS	5980do			
1300-1400	Singapore,R Singapore Int	6015as	6150as		
1300-1330	South Korea, R Korea Intl	9640as			
1300-1400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1300-1400	Taiwan, Radio Taipei Intl	15125as			
1300-1400 as	Tanzania, Radio	5050af			
1300-1330	Turkey, Voice of	15295as	17815as		
1300-1400	Uganda, Radio	4976do			
1300-1400	UK, BBC World Service	5965am	5990as	6190af	6195va
		9410eu	9515am	9740as	11760me
		11940af	12095eu	15220am	15310as
		15420af	15485eu	15565eu	15575me
		17640eu	17705va	17830af	17885af
		21660af			
1300-1400	UK, Merlin Network One	9915eu	13645eu	17650eu	21550af
1300-1400	USA, KAIJ Dallas TX	5810na	9815al		
1300-1400	USA, KJES Vado NM	11715na			
1300-1400	USA, KNLS Anchor Point AK	9615as			
1300-1400	USA, KTBN Salt Lk City UT	7510na			
1300-1400	USA, KWHR Naalehu HI	9930as	11565pa		
1300-1400	USA, Voice of America	6160as	9645as	9760as	11705as
		11715as	15425as		
1300-1400	USA, WEWN Birmingham AL	11875na	15745eu		
1300-1400	USA, WGTG McCaysville GA	9400am			
1300-1400	USA, WHRI Noblesville IN	6040na	15105am		
1300-1400	USA, WJCR Upton KY	7490na	13595as		
1300-1400 s	USA, WRMI/R Miami Intl	9955am			
1300-1400	USA, WRNO New Orleans LA	7395na			
1300-1400	USA, WSHB Cypress Crk SC	9430na	11660am		
1300-1400	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1300-1400	USA, WYFR Okeechobee FL	11550as	11830na	11970na	13695na
		17750na			
1300-1400	Zambia, Christian Voice	6065af			
1300-1400	Zambia, Natl BC Corp	6165do	6265do		
1300-1400 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1305-1310	Croatia, Croatian Radio	6130eu			
1315-1325 mtwhfa	Bhutan, Bhutan BC Service	5030do			
1325-1400	Germany, Voice of Hope	15715as			
1330-1400	Austria, R Austria Intl	13730va			
1330-1359	Canada, R Canada Intl	6150as	9535as	9640na	13650na
		17715na			
1330-1400	Germany,Overcomer Ministr	6010eu			
1330-1400	Guam, AWR/KSDA	11705as			
1330-1400	India, All India Radio	9545as	11620as	13710as	
1330-1400	Sweden, Radio	15240na	17505as		
1330-1400	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1330-1400	Uzbekistan, R Tashkent	5060as	5975as	6025as	9715as
		11905as	15295as	17775as	
1330-1355	Vietnam, Voice of	5940eu	7270eu	7400eu	9840eu
		12019eu			
1345-1400	Vatican State, Vatican R	13765au	15500au		

Selected Programs

Sundays

1300 Costa Rica, R Peace Intl: RadioNation. See S 0500.
1300 Ecuador, HCJB Quito (am): Weekend Magazine. See S 0000.
1330 Ecuador, HCJB Quito (am): Mountain Meditations. A mixture of music and devotional thoughts in an Andean setting.

Mondays

1300 Ecuador, HCJB Quito (am): Precept. Kay Arthur offers a fresh approach to daily Bible study.
1305 Costa Rica, R Peace Intl: Spiritual Awakening. See M 0505.
1313 Ecuador, HCJB Quito (am): Getting the Message. Two minutes of Bible interpretation.
1315 Ecuador, HCJB Quito (am): Proclaim! Daily encouragement for godly living with Dr. Joseph Stowell, President of the Moody Bible Institute.
1330 Costa Rica, R Peace Intl: Peace Talks. See M 0530.
1330 Ecuador, HCJB Quito (am): Focus on the Family. Psychologist James Dobson on everyday family matters.
1356 Ecuador, HCJB Quito (am): Beyond the Call. Real questions and real answers on Christian living with Dr. Ron Cline, HCJB World Radio President.
1357 Ecuador, HCJB Quito (am): Parent Talk Tip. Randy Carlson and Dr. Kevin Leman with advice for child-rearing.

Tuesdays

1300 Costa Rica, R Peace Intl: Millennium Dreams. See S 0400.
1300 Ecuador, HCJB Quito (am): Precept. See M 1300.
1313 Ecuador, HCJB Quito (am): Getting the Message. See M 1313.
1315 Ecuador, HCJB Quito (am): Proclaim! See M 1315.
1330 Costa Rica, R Peace Intl: UN Caribbean Echo. See T 0530.
1330 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
1347 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
1355 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
1356 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.
1357 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Wednesdays

1300 Costa Rica, R Peace Intl: Living Enrichment Center. See M 0620.
1300 Ecuador, HCJB Quito (am): Precept. See M 1300.
1313 Ecuador, HCJB Quito (am): Getting the Message. See M 1313.
1315 Ecuador, HCJB Quito (am): Proclaim! See M 1315.
1330 Costa Rica, R Peace Intl: UNESCO. See W 0530.
1330 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
1345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
1355 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
1356 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.
1357 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Thursdays

1300 Costa Rica, R Peace Intl: New Dimensions Radio. See M 2300.
1300 Ecuador, HCJB Quito (am): Precept. See M 1300.
1313 Ecuador, HCJB Quito (am): Getting the Message. See M 1313.
1315 Ecuador, HCJB Quito (am): Proclaim! See M 1315.
1330 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
1345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
1355 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
1356 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.
1357 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Fridays

1300 Costa Rica, R Peace Intl: WINGS. See S 0630.
1300 Ecuador, HCJB Quito (am): Precept. See M 1300.
1313 Ecuador, HCJB Quito (am): Getting the Message. See M 1313.
1315 Ecuador, HCJB Quito (am): Proclaim! See M 1315.
1330 Costa Rica, R Peace Intl: Tropical Conservation Newsbureau Report. See T 0244.
1330 Ecuador, HCJB Quito (am): Focus on the Family. See M 1330.
1345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
1355 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
1356 Ecuador, HCJB Quito (am): Beyond the Call. See M 1356.
1357 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Saturdays

1300 Costa Rica, R Peace Intl: RFPI Reports. See S 1545.
1300 Ecuador, HCJB Quito (am): Children's Bible Hour. Songs and stories for children.
1330 Costa Rica, R Peace Intl: The Tico Times Report. See M 2330.
1330 Ecuador, HCJB Quito (am): Jungle Jam and Friends. A program for children.
1340 Costa Rica, R Peace Intl: The Neumaier Report. See M 2330.
1345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
1355 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.

GRUNDIG
Gives you the World

Grundig leads shortwave radio into the new Millennium!
When radio was introduced, back in the 1920's — to pluck voices and music out of thin air — people thought it was magic. With Grundig, it still is! No other manufacturer rivals Grundig for *"that European sound."* Voices have an *"in-the-room"* quality and clarity — even from half a world away.

German-engineered quality... German-engineered sound... when people think of shortwave, they think of Grundig. Grundig has specialized in shortwave since the late 1950's, and in North America, shortwave radios are all we sell.

Critics reviews of Grundig models include
Best of Category... Superior Performance... Ergonomically Better... Superb Sound Quality... An Excellent Choice

We listen, too.
We're very good at listening — to our customers. Our engineers design each model so it's easy, intuitive and convenient to use. Critics call this *"great ergonomics!"* And Grundig models always deliver top performance for the price. Critics call this *"bang for the buck."*

GRUNDIG

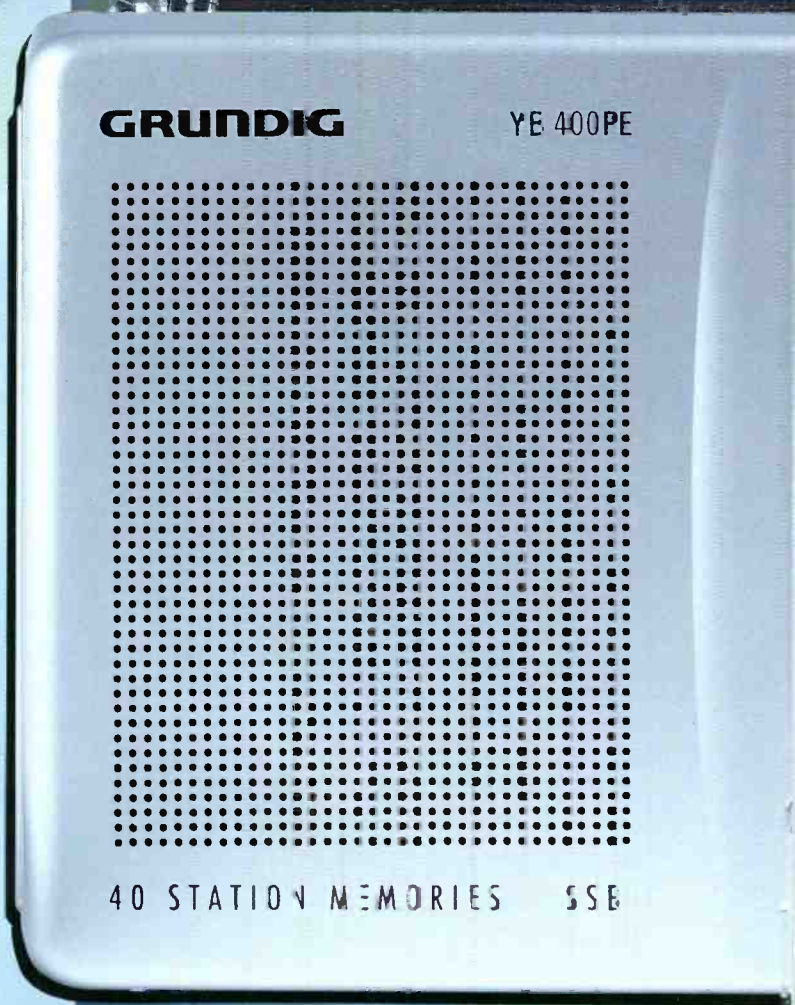
The Latest in Technology

Rated Best in Its Class.
Grundig's Yacht Boy 400PE has received rave reviews from the shortwave press for combining a wealth of sophisticated features in a sleek titanium-look package that doesn't cost a fortune. It incorporates features found on stationary shortwave systems that cost thousands, such as outstanding audio quality, precise 1 kHz increment tuning, up/down slewing, frequency scanning, signal strength indication, and single-sideband signal demodulation.

But the advantage mentioned most often in the reviews is its ease of use for the novice listener. In moments you can listen to foreign broadcasts beamed to North America.

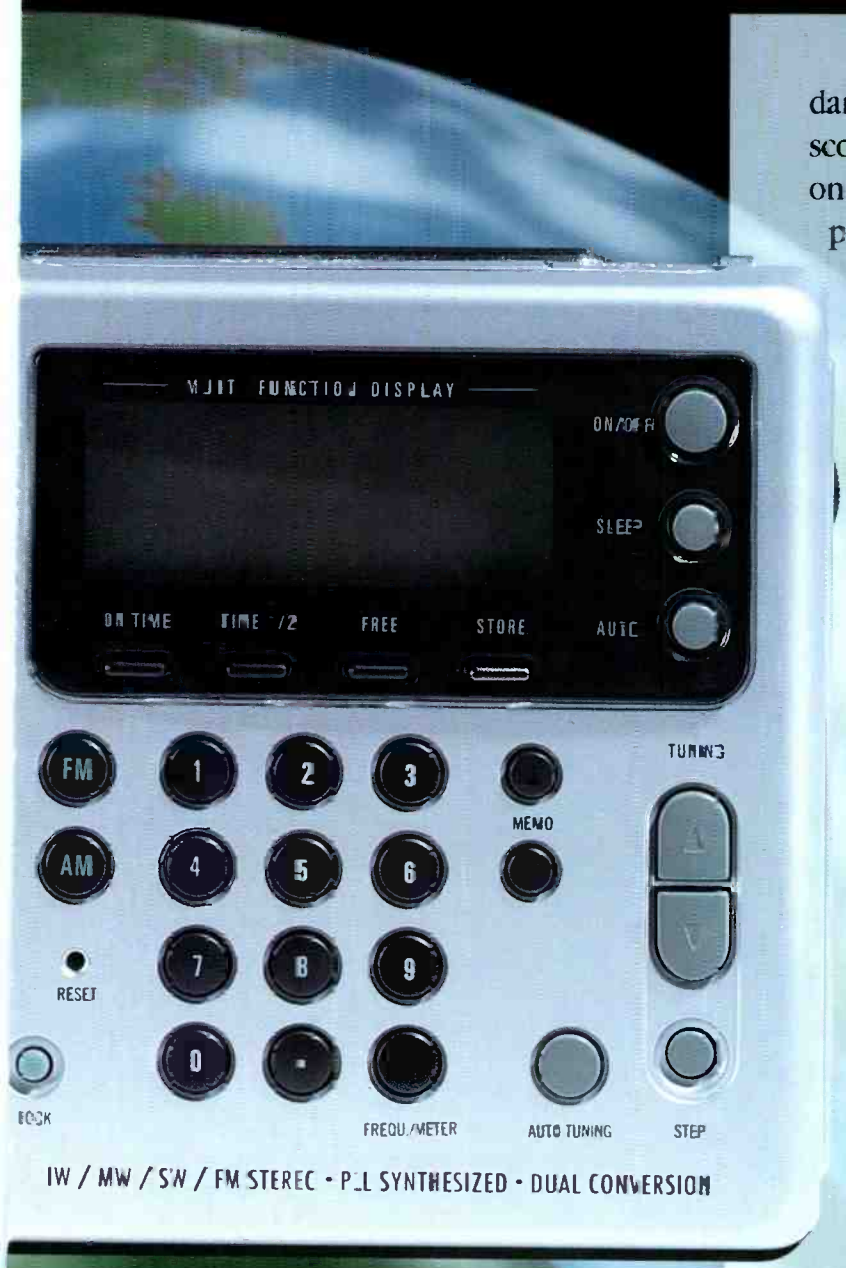
Soon, you will be scanning the airwaves to tune in exotic music programs and sports events from faraway locales. The YB-400PE even picks up shortwave amateur (ham radio) broadcasts and shortwave aviation/military frequencies (cockpit-to-tower communications). The possibilities for family fun, education, and enjoyment are boundless.

For travel or home use, Grundig adds a dual-time travel clock with snooze and sleep timer. The FM band is stereophonic with your headphones. The lighted LCD panel is easy to read in the



Yacht Boy 400PE

The Best in Value!



dark. Comes with a form-fitting pouch, integral telescoping antenna and advanced external antenna on a compact reel, carry-strap, ac-adapter, earphones and complete instructions.

Made by Germany's Grundig.
World leader in shortwave radios, the 400PE measures just 7-3/4"L x 4-1/4"H x 1-1/4"W; weighs only 20 oz. It slips easily into your carry-on for travel and fits on a nightstand, office credenza, or yacht cabin console. One-year warranty.

Grundig's Yacht Boy 400PE Named Editor's Choice.
Passport To World Band Radio is regarded as the leading authority of the shortwave industry. Here's what their testing expert wrote about the Grundig Yacht Boy 400PE:

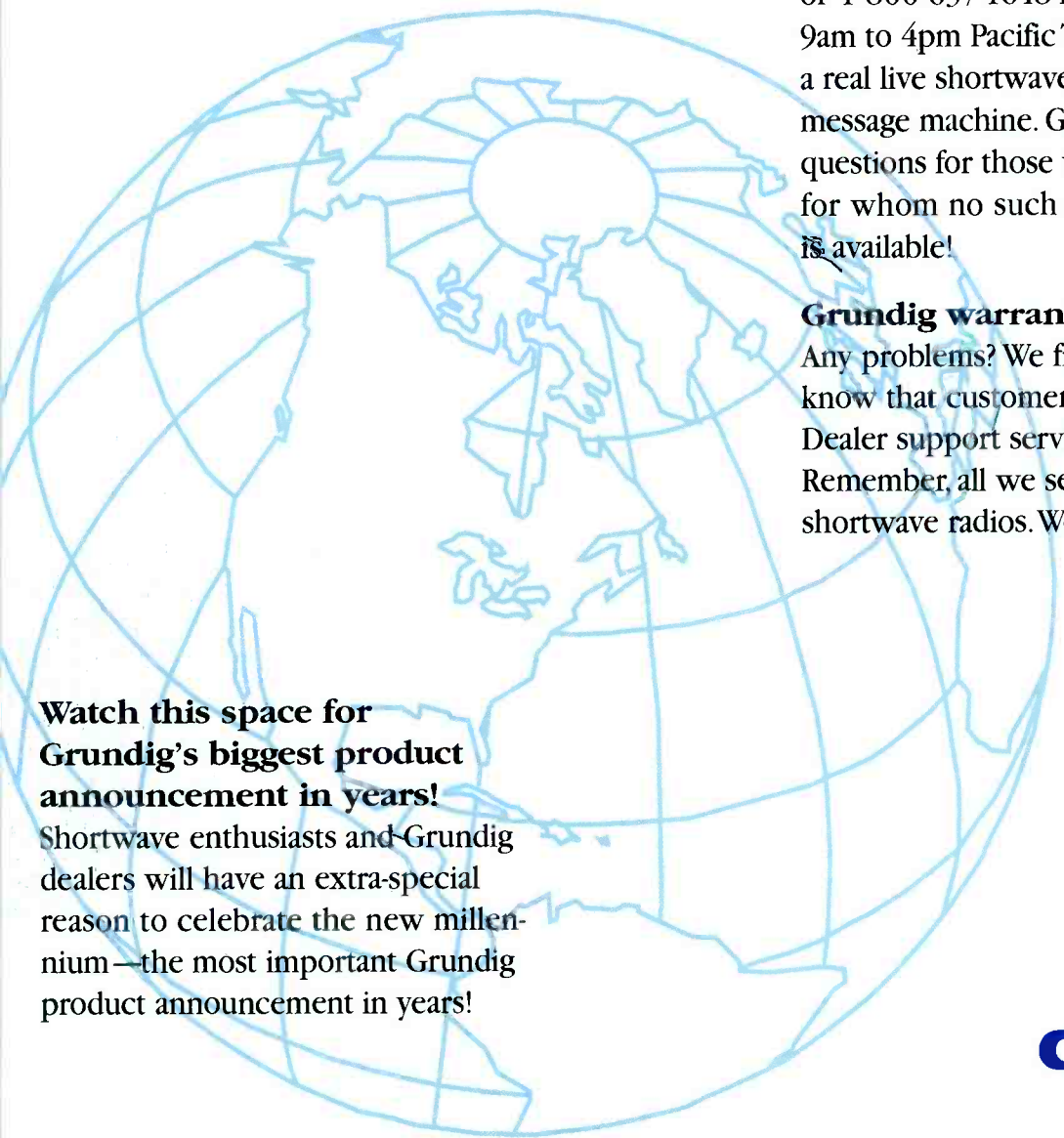
"Best performance for price size category, and among the choicest portables of any size, at any price."

"The 400's FM performance is right up there with the very best among world band radios."

Please call our shortwave hotline and talk to the experts: 800-872-2228.

Grundig sets the standard for customer service.
Grundig supports the industry's only Toll-free Shortwave Hotline. Consumers and dealers can call 1-800-872-2228 in the United States or 1-800-637-1648 in Canada weekdays from 9am to 4pm Pacific Time. You can speak with a real live shortwave expert, not an automatic message machine. Grundig even answers questions for those who own other brands, for whom no such toll-free hotline service is available!

Grundig warranty service is the best.
Any problems? We fix them fast. Dealers know that customers will be taken care of! Dealer support service is first-rate, too. Remember, all we sell in North America are shortwave radios. We specialize! We do it best!



Watch this space for Grundig's biggest product announcement in years!
Shortwave enthusiasts and Grundig dealers will have an extra-special reason to celebrate the new millennium—the most important Grundig product announcement in years!

GRUNDIG
made for you

Frequencies

1400-1500	Anguilla,Caribbean Beacon	11775am			
1400-1500 vl	Australia, ABC/Alice Spgs	2310do			
1400-1500 vl	Australia, ABC/Katherine	2485do			
1400-1500 vl	Australia, ABC/Tent Creek	2325do			
1400-1500	Australia, Radio	5995pa	6020pa	6080as	9580pa
1400-1500 vl	Botswana, Radio	4820do	4830do	7255do	
1400-1500 vl	Canada, CBC N Quebec Svc	9625do			
1400-1500	Canada, CFRX Toronto	6070do			
1400-1500	Canada, CFVP Calgary	6030do			
1400-1500	Canada, CHNX Halifax	6130do			
1400-1500	Canada, CKZN St John's	6160do			
1400-1500	Canada, CKZU Vancouver	6160do			
1400-1459 mtwhfs	Canada, R Canada Intl	9640am	13650am	17715am	
1400-1456	China, China Radio Intl	7405na	9535as	9700as	11825as
		13685af	15125af		
1400-1500	Costa Rica,RF Peace Intl	21460am			
1400-1500	Ecuador, HCJB	12005ca	15115am	21455va	
1400-1500 as/vl	Eqt Guinea, R East Africa	15186af			
1400-1457	France, Radio France Intl	11910as	12030as	17560af	
1400-1500	Germany, RTE Radio	15625eu			
1400-1500	Germany, Sunrise Radio	5850eu			
1400-1500 a	Germany, Universal Life	9710eu			
1400-1500 s	Germany, Universal Life	9955eu			
1400-1500	Germany, Voice of Hope	15715as			
1400-1500	Germany,Overcomer Ministr	6010eu			
1400-1500 vl	Ghana, Ghana BC Corp	4915do	6130do		
1400-1500	Guyana, GBC/Voice of	3290al	5950do		
1400-1500	India, All India Radio	9545as	11620as	13710as	
1400-1430	Israel, Kol Israel	15650va	17535va		
1400-1500	Japan, Radio/NHK	9505na	11730as	11880af	
1400-1500	Jordan, Radio	11690eu			
1400-1500	Kenya, Kenya BC Corp	4935do			
1400-1500 vl	Lesotho, Radio	4800do			
1400-1500	Malaysia, Radio	7295do			
1400-1500	Malaysia, RTM Sarawak	7160do			
1400-1500 vl	Malaysia,RTM KotaKinabalu	5980do			
1400-1430	Mexico, Radio Mexico Intl	5985al	9705am		
1400-1500	N Marianas, KFBS Saipan	9465as	9495as	9670as	
1400-1500 vl	Namibia, NBC	6060af	6175af		
1400-1500 occsnal	New Zealand, R NZ Intl	6105pa			
1400-1500 vl	Nigeria, Radio/Ibadan	6050do			
1400-1500 vl	Nigeria, Radio/Kaduna	4770do			
1400-1500	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840va
		15725as			
1400-1500 vl	Papua New Guinea, NBC	4890do			
1400-1500	Philippines, FEBC R Intl	11995as			
1400-1500	Russia,Voice of Russia WS	9475as	9480eu	9710eu	9800as
		11500as	15550as		
1400-1455 as	S Africa, Channel Africa	11900af	17895af	21530af	
1400-1500	Sierra Leone, SLBS	5980do			
1400-1500	Singapore,RCorp Singapore	6150do			
1400-1500	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1400-1500	Switzerland, Swiss R Intl	9575as	17670as		
1400-1500	Taiwan, Radio Taipei Intl	15125as			
1400-1500 as	Tanzania, Radio	5050af			
1400-1430	Thailand, Radio	9530as	9655as	11905as	
1400-1500	Uganda, Radio	4976do			
1400-1500	UK, BBC World Service	3990as	6190af	6195as	9410eu
		9515am	9740as	11865am	11940af
		12095eu	15220am	15310as	15485eu
		15565eu	15575ma	17640eu	17705va
		17830af	17840am	21470af	21660af
1400-1500	UK, Merlin Network One	9915eu	13645eu	17630eu	21550af
1400-1500	USA, KAIJ Dallas TX	13815na	15725al		
1400-1500	USA, KJES Vado NM	11715na			
1400-1500	USA, KTBN Salt Lk City UT	7510na			
1400-1500	USA, KWHR Naalehu HI	9930as	11565pa		
1400-1500	USA, Voice of America	6110as	7125as	7215as	9645as
		9760as	11705as	15205me	15395as
		15425as			
1400-1500	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1400-1500	USA, WGTG McCaysville GA	9400am			
1400-1500	USA, WHRI Noblesville IN	6040na	15105am		
1400-1500	USA, WJCR Upton KY	7490na	13595as		
1400-1500 irreg	USA, WMLK Bethel PA	9465am			
1400-1500	USA, WRNO New Orleans LA	7395na			
1400-1500	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1400-1500	USA, WYFR Okeechobee FL	11550as	11830na	11970na	17750na
1400-1405	Vatican State, Vatican R	13765au	15500au		
1400-1500	Zambia, Christian Voice	6065af			
1400-1500	Zambia, Natl BC Corp	6165do	6265do		
1400-1500 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1410-1420	Greece, Voice of	7450eu	9425na		
1415-1420	Nepal, Radio	5005as	7165as		
1430-1500	Australia, Radio	9500as	11660as		
1430-1459	Canada, R Canada Intl	9555va	11915va	15325va	
1430-1500 vl	China, China Radio Intl	6995as	9880as		
1430-1500	Guam, AWR/KSDA	11980as			
1430-1500	Myanmar, Radio	5990do			
1430-1500	Netherlands, Radio	12070as	12090as	15585as	
1430-1500	S Africa, RTE Radio	21745af			

Selected Programs

Sundays

1400 Costa Rica, R Peace Intl: Vietnam Veterans Radio Network. Bringing to light the real stories behind the Vietnam War.
1400 Ecuador, HCJB Quito (am): Simply Worship. A Northern Ireland program of music, readings and meditation.
1405 UK, BBC London (AE/AF/AS): NEW! Talking Point (live). Robin Lustig and Diana Madill take listener opinions on controversial topics by phone or e-mail.
1430 Costa Rica, R Peace Intl: WINGS. See S 0630.
1430 Ecuador, HCJB Quito (am): Moody Presents. Christian messages from the Moody Bible Institute.

Mondays

1400 Ecuador, HCJB Quito (am): Gateway to Joy. Elizabeth Elliot with contemporary women's issues from a Biblical perspective.
1414 Ecuador, HCJB Quito (am): RBC Spot Radio. A one-minute item from Radio Bible Class.
1415 Ecuador, HCJB Quito (am): Key Life. Steve Brown presents truthful teachings.
1420 Costa Rica, R Peace Intl: Global Community Forum/Far Right Radio Review. The program takes a critical look at radical, reactionary, right-wing organizations and their spokespeople on shortwave and other mediums.
1428 Ecuador, HCJB Quito (am): The Bible Minute. It's actually two minutes.
1430 Ecuador, HCJB Quito (am): Let My People Think. See S 1530.

Tuesdays

1400 Costa Rica, R Peace Intl: Rebel Radio. A broad look at the micro-radio movement and how these micro-broadcasters struggle for freedom of speech.
1400 Costa Rica, R Peace Intl: Steppin' Out of Babylon. Sue Supriano interviews people who speak out against injustice and stand up for freedom and liberty.
1414 Ecuador, HCJB Quito (am): RBC Spot Radio. See M 1414.
1415 Ecuador, HCJB Quito (am): Key Life. See M 1415.
1428 Ecuador, HCJB Quito (am): The Bible Minute. See M 1428.
1430 Costa Rica, R Peace Intl: New Dimensions Radio. See M 2300.
1430 Ecuador, HCJB Quito (am): The Living Word. Brother Bob Russell of Southeast Christian Church of Louisville, Kentucky conducts the sermon.

Wednesdays

1400 Costa Rica, R Peace Intl: WINGS. See S 0630.
1400 Ecuador, HCJB Quito (am): Gateway to Joy. See M 1400.
1414 Ecuador, HCJB Quito (am): RBC Spot Radio. See M 1414.
1415 Ecuador, HCJB Quito (am): Key Life. See M 1415.
1428 Ecuador, HCJB Quito (am): The Bible Minute. See M 1428.
1430 Costa Rica, R Peace Intl: Voices of Our World. See M 0430.
1430 Ecuador, HCJB Quito (am): Back to God Hour. The Christian Reformed Church looks at life in light of the historic Christian faith.

Thursdays

1400 Ecuador, HCJB Quito (am): Gateway to Joy. See M 1400.
1414 Ecuador, HCJB Quito (am): RBC Spot Radio. See M 1414.
1415 Ecuador, HCJB Quito (am): Key Life. See M 1415.
1428 Ecuador, HCJB Quito (am): The Bible Minute. See M 1428.
1430 Ecuador, HCJB Quito (am): Science, Scripture and Salvation. See M 0545.

Fridays

1400 Costa Rica, R Peace Intl: CounterSpin. See S 0300.
1400 Ecuador, HCJB Quito (am): Gateway to Joy. See M 1400.
1414 Ecuador, HCJB Quito (am): RBC Spot Radio. See M 1414.
1415 Ecuador, HCJB Quito (am): Key Life. See M 1415.
1428 Ecuador, HCJB Quito (am): The Bible Minute. See M 1428.
1430 Costa Rica, R Peace Intl: This Way Out. See S 1500.
1430 Ecuador, HCJB Quito (am): Haven. Evangelizing and The Haven Quartet.

Saturdays

1400 Costa Rica, R Peace Intl: Second Opinion. See S 0100.
1400 Ecuador, HCJB Quito (am): Alive! See S 0300.
1430 Costa Rica, R Peace Intl: Steppin' Out of Babylon. See T 1400.

1500 UTC SHORTWAVE GUIDE

11:00 AM EDT
10:00 AM CDT
8:00 AM PDT

Frequencies

1500-1600	Anguilla,Caribbean Beacon	11775am			
1500-1600 vl	Australia, ABC/Alice Spgs	2310do			
1500-1600 vl	Australia, ABC/Katherine	2485do			
1500-1600 vl	Australia, ABC/Tent Creek	2325do			
1500-1600	Australia, Radio	5995pa	9500as	9580pa	9660pa
		11660as			
1500-1600 vl	Botswana, Radio	4820do	4830do	7255do	
1500-1600 vl	Canada, CBC N Quebec Svc	9625do			
1500-1600	Canada, CFRX Toronto	6070do			
1500-1600	Canada, CFVP Calgary	6030do			
1500-1600	Canada, CHNX Halifax	6130do			
1500-1600	Canada, CKZN St John's	6160do			
1500-1600	Canada, CKZU Vancouver	6160do			
1500-1600 s	Canada, R Canada Intl	9640am	13650am	17715am	
1500-1600	China, China Radio Intl	7160as	7405na	9785as	13685af
		15125af			
1500-1600	Costa Rica,RF Peace Intl	15050am	21460am		
1500-1600	Ecuador, HCJB	12005ca	15115am	21455va	
1500-1600 as/vl	Eqt Guinea, R East Africa	15186af			
1500-1600	Germany, Sunrise Radio	5850eu			
1500-1530	Germany, Voice of Hope	15715as			
1500-1600	Germany,Overcomer Ministr	6010eu			
1500-1600 vl	Ghana, Ghana BC Corp	4915do	6130do		
1500-1600	Guam, TWR/KTWR	12015as			
1500-1600	Guyana, GBC/Voice of	3290al	5950do		
1500-1600	Japan, Radio/NHK	7200as	9505na	9750as	11730as
1500-1600	Jordan, Radio	11690eu			
1500-1600	Kenya, Kenya BC Corp	4935do			
1500-1600 vl	Lesotho, Radio	4800do			
1500-1510	Liberia,LCN/R Liberia Int	5100do			
1500-1600	Malaysia, Radio	7295do			
1500-1600	Malaysia, RTM Sarawak	7160do			
1500-1600 vl	Malaysia,RTM KotaKinabalu	5980do			
1500-1530	Mexico, Radio Mexico Intl	5985al	9705am		
1500-1530	Mongolia, Voice of	11790as	12085as		
1500-1600	Myanmar, Radio	5990do			
1500-1600	N Marianas, KFBS Saipan	9465as	9495as	9670as	
1500-1600 vl	Namibia, NBC	6060af	6175af		
1500-1600	Netherlands, Radio	12070as	12090as	15585as	
1500-1600 occsnal	New Zealand, R NZ Intl	6105pa			
1500-1600 vl	Nigeria, Radio/Ibadan	6050do			
1500-1600 vl	Nigeria, Radio/Kaduna	4770do			
1500-1600 vl	Nigeria, Voice of	7255af	15120va		
1500-1600	North Korea, R Pyongyang	3560as	9640va	9975me	11335am
		11735am	13650va		
1500-1600	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
1500-1600 vl	Papua New Guinea, NBC	4890do			
1500-1600	Philippines, FEBC R Intl	11995as			
1500-1600 vl	Russia, Voice of Assyria	6005me	9480me		
1500-1600	Russia,Voice of Russia WS	4730me	4940me	4975me	7210me
		11500me	12065me		
1500-1600 sm	Russia,Voice of Russia WS	6005me			
1500-1530	S Africa, Channel Africa	17870af			
1500-1600 mtwhfa	Seychelles, FEBA Radio	9810as	11600as		
1500-1600	Sierra Leone, SLBS	5980do			
1500-1600	Singapore,RCorp Singapore	6150do			
1500-1600	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1500-1600 as	Tanzania, Radio	5050af			
1500-1600	Uganda, Radio	4976do			
1500-1600	UK, BBC World Service	5975as	5990as	6190af	6195as
		9410eu	9515am	9740as	11860af
		11940af	12095eu	15220am	15310as
		15400af	15420af	15485eu	15575eu
		17705va	17830af	17840am	21470af
		21490af	21660af		
1500-1600	UK, Merlin Network One	9915eu	13645eu	21550af	
1500-1600	USA, KAIJ Dallas TX	13815na	15725al		
1500-1600	USA, KJES Vado NM	11715na			
1500-1600	USA, KTBN Salt Lk City UT	15590na			
1500-1600	USA, KWHR Naalehu HI	9930as	11565pa		
1500-1600	USA, Voice of America	6110as	7125as	7215as	9575me
		9645as	9760as	9845as	12040as
		15205me	15395as		
1500-1600	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1500-1600	USA, WGTG McCaysville GA	9400am			
1500-1600	USA, WHRI Noblesville IN	6040af	13760na	15105sa	
1500-1600	USA, WJCR Upton KY	7490na	13595as		
1500-1600 irreg	USA, WMLK Bethel PA	9465am			
1500-1600	USA, WRNO New Orleans LA	7395na	15420al		
1500-1600	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1500-1600	USA, WYFR Okeechobee FL	11830na	17750na		
1500-1600	Zambia, Christian Voice	6065af			
1500-1600	Zambia, Natl BC Corp	6165do	6265do		
1500-1600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1530-1540	Bangladesh, Bangla Betar	4880as	15520as		
1530-1600	Guam, AWR/KSDA	11930as			
1530-1545	India, All India Radio	4775as	4850as	9700as	11740as
1530-1600	Iran, VOIRI	9780as	11775as	13605as	
1530-1545 s	Seychelles, FEBA Radio	11600as			
1530-1600	Tanzania, Radio	5050af			
1545-1600 sh	Bangladesh, Bangla Betar	4880as	15520as		
1550-1600	Vatican State, Vatican R	11640va	13760va		

Selected Programs

Sundays

1500 Costa Rica, R Peace Intl: This Way Out. A lesbian and gay radio magazine.
1500 Ecuador, HCJB Quito (am): Encounter. Expository biblical preaching by Stephen Olford.
1530 Ecuador, HCJB Quito (am): Let My People Think. Addressing questions of today's thinking Christians.
1545 Costa Rica, R Peace Intl: RFPI Reports. Daily news program of Latin American and Caribbean topics not generally heard in the mainstream media.
1550 Costa Rica, R Peace Intl: Earthwatch Radio. This informative, succinct two-minute feature explores almost every imaginable environmental topic.
1552 Costa Rica, R Peace Intl: Earth and Sky. A short earth science and astronomy feature.

Mondays

1500 Costa Rica, R Peace Intl: World of Radio. See S 0200.
1500 Ecuador, HCJB Quito (am): Back to the Bible. A mix of music and daily Bible study.
1525 Ecuador, HCJB Quito (am): Joni and Friends. Joni Erickson-Tada presents help and advice especially for the disabled.
1530 Ecuador, HCJB Quito (am): Thru the Bible. J. Vernon McGee presents a book-by-book study of the Bible.
1545 Costa Rica, R Peace Intl: RFPI Reports. See S 1545.
1555 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
1557 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.
1558 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Tuesdays

1500 Costa Rica, R Peace Intl: New Dimensions Radio. See M 2300.
1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
1525 Ecuador, HCJB Quito (am): Joni and Friends. See M 1525.
1530 Costa Rica, R Peace Intl: The Tico Times Report. See M 2330.
1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
1545 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
1550 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
1552 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.
1558 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Wednesdays

1500 Costa Rica, R Peace Intl: Peace Forum. A grab bag of individual programs and special short series received by RFPI.
1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
1525 Ecuador, HCJB Quito (am): Joni and Friends. See M 1525.
1530 Costa Rica, R Peace Intl: UN Perspective. See T 2330.
1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
1545 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
1550 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
1552 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.
1558 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Thursdays

1500 Costa Rica, R Peace Intl: Peace Forum. See W 1500.
1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
1525 Ecuador, HCJB Quito (am): Joni and Friends. See M 1525.
1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
1540 Costa Rica, R Peace Intl: Women. See W 2330.
1545 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
1550 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
1552 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.
1558 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Fridays

1500 Costa Rica, R Peace Intl: Peace Forum. See W 1500.
1500 Ecuador, HCJB Quito (am): Back to the Bible. See M 1500.
1525 Ecuador, HCJB Quito (am): Joni and Friends. See M 1525.
1530 Costa Rica, R Peace Intl: UN Scope. A news program about the United Nations and its related agencies.
1530 Ecuador, HCJB Quito (am): Thru the Bible. See M 1530.
1545 UK, BBC London (AF): To Boldly Go. New feature program of the Learning Zone.
1550 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
1552 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.
1555 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
1558 Ecuador, HCJB Quito (am): Parent Talk Tip. See M 1357.

Saturdays

1500 Costa Rica, R Peace Intl: Peace Forum. See W 1500.
1500 Ecuador, HCJB Quito (am): Words of Hope. David Bass provides the message.
1530 Ecuador, HCJB Quito (am): Songtime Weekend. Evangelical teachings and music from Boston.
1545 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
1550 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
1552 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.

This magazine is by far the most informative and helpful radio magazine for SWLs ever. It is truly the best.
–John Marko

Frequencies

1600-1700	Algeria, R Algiers Intl	6160af	11715af	15160me	
1600-1700	Anguilla,Caribbean Beacon	11775am			
1600-1700 vl	Australia, ABC/Alice Spgs	2310do			
1600-1700 vl	Australia, ABC/Katherine	2485do			
1600-1700 vl	Australia, ABC/Tent Creek	2325do			
1600-1700	Australia, Radio	5995pa	9500as	9580pa	9660pa
		11660as			
1600-1700 vl	Botswana, Radio	4820do	4830do	7255do	
1600-1700 vl	Canada, CBC N Quebec Svc	9625do			
1600-1700	Canada, CFRX Toronto	6070do			
1600-1700	Canada, CFVP Calgary	6030do			
1600-1700	Canada, CHNX Halifax	6130do			
1600-1700	Canada, CKZN St John's	6160do			
1600-1700	Canada, CKZU Vancouver	6160do			
1600-1659 s	Canada, R Canada Intl	9640am	13650am	17715am	
1600-1656	China, China Radio Intl	9565af			
1600-1700	Costa Rica,RF Peace Intl	15050am	21460am		
1600-1627	Czech Rep, R Prague Intl	5930eu	21745af		
1600-1700	Ethiopia, Radio	7165af	9560af		
1600-1654	France, Radio France Intl	11615af	11700af	11995af	12015af
		15210af	15530af		
1600-1645	Germany, Deutsche Welle	6140eu	6170as	7225as	9735af
		9875as	11810af	15135af	17595as
		21695af			
1600-1700	Germany, Sunrise Radio	5850eu			
1600-1700 a	Germany,Good News World R	11840va			
1600-1700	Germany,Overcomer Ministr	6010eu			
1600-1700 vl	Ghana, Ghana BC Corp	4915do	6130do		
1600-1700	Guam, AWR/KSDA	11750as			
1600-1630	Guam, TWR/KTWR	12015as			
1600-1700	Guyana, GBC/Voice of	3290al	5950do		
1600-1630	Iran, VOIRI	9780as	11775as	13605as	
1600-1630	Jordan, Radio	11690eu			
1600-1700	Kenya, Kenya BC Corp	4935do			
1600-1700	Lebanon, Voice of Hope	9960me			
1600-1700 vl	Lesotho, Radio	4800do			
1600-1700	Malaysia, Radio	7295do			
1600-1700	N Marianas, KFBS Saipan	9465as	9495as		
1600-1700 vl	Namibia, NBC	6060af	6175af		
1600-1625	Netherlands, Radio	12070as	12090as	15585as	
1600-1650 occsnal	New Zealand, R NZ Intl	6105pa			
1600-1700 vl	Nigeria, Radio/Ibadan	6050do			
1600-1700 vl	Nigeria, Radio/Kaduna	4770do			
1600-1700	Nigeria, Voice of	7255af	15120va		
1600-1630	Pakistan, Radio	11570me	15170af	15325eu	15462me
		17720af			
1600-1700	Palau, KHBN/Voice of Hope	9955as	9965as		
1600-1700 vl	Papua New Guinea, NBC	4890do			
1600-1700	Russia,Voice of Russia WS	9830me	12065me		
1600-1630	S Africa, Channel Africa	6000af			
1600-1700	Sierra Leone, SLBS	5980do			
1600-1700	South Korea, R Korea Intl	5975as	9515va	9870as	
1600-1700	Swaziland, Trans World R	9500af			
1600-1615	Switzerland, Swiss R Intl	9575as	17670as		
1600-1700	Tanzania, Radio	5050af			
1600-1645	UAE, Radio Dubai	13630eu	13675eu	15395eu	21700eu
1600-1700	Uganda, Radio	4976do			
1600-1700	UK, BBC World Service	3915as	5975as	5990as	6190af
		6195as	7160as	9410eu	9515am
		9740as	11940af	12095eu	15310as
		15400af	15485eu	15575eu	17705as
		17830af	17840am	21470af	21660af
1600-1700	UK, Merlin Network One	6175eu	21550af		
1600-1700	USA, KAIJ Dallas TX	13815na	15725al		
1600-1700	USA, KTBN Salt Lk City UT	15590na			
1600-1700	USA, KWHR Naalehu HI	9930as	11565pa		
1600-1700	USA, Voice of America	6035af	6110as	7125as	7215as
		9575me	9645as	9760as	11920af
		12040af	13600af	13710af	15205me
		15225af	15240af	15395as	15410af
		15445af	17895af		
1600-1700	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1600-1700	USA, WGTG McCaysville GA	9400am			
1600-1700	USA, WHRI Noblesville IN	13760na	15105sa		
1600-1700	USA, WJCR Upton KY	7490na	13595as		
1600-1700 irreg	USA, WMLK Bethel PA	9465am			
1600-1700	USA, WRNO New Orleans LA	7395na	15420al		
1600-1700	USA, WSHB Cypress Crk SC	18910af			
1600-1700	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1600-1700	USA, WYFR Okeechobee FL	11830na	15600na	15695eu	17555eu
		17750na	21525af		
1600-1610	Vatican State, Vatican R	11640va	13760va		
1600-1625	Vietnam, Voice of	5940eu	7270eu	7400eu	9840af
		12019eu			
1600-1700	Zambia, Christian Voice	3330af	4965af		
1600-1700	Zambia, Natl BC Corp	6165do	6265do		
1600-1630 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1615-1645 a	UK, BBC World Service	11860af			
1615-1700 a	UK, BBC World Service	9515am			
1615-1630	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
		15595eu			
1630-1700	Austria, R Austria Intl	6155va	13730va	15240va	17560va
1630-1700	Canada, R Canada Intl	6140as	7150as		
1630-1700 s	Canada, R Canada Intl	9640na	13650na	17715na	
1630-1700	Egypt, Radio Cairo	15255af			
1630-1700 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
1630-1700	Georgia, Georgian Radio	6180me			
1630-1700 s	Seychelles, FEBA Radio	11665as			
1630-1700	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	
1630-1700 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1645-1700	Germany, Deutsche Welle	6140eu			
1645-1700	Tajikistan, Radio	7245as			
1645-1700 smwf	UK, BBC World Service	11860af			
1650-1700 mtwhf	New Zealand, R NZ Intl	11675pa			

Selected Programs

Sundays

1600 France, R France Intl: News. See S 1200.
1619 France, R France Intl: Asia File. See S 1219.
1630 France, R France Intl: News Headlines. See S 1230.
1633 France, R France Intl: Club 9516. See S 1233.

Mondays

1600 Costa Rica, R Peace Intl: RadioNation. See S 0500.
1600 France, R France Intl: News. See S 1200.
1625 France, R France Intl: Review of the French Newspapers. See M 1225.
1630 France, R France Intl: News Headlines. See S 1230.
1631 France, R France Intl: Sports Magazine. See M 1231.
1632 France, R France Intl: RFI Europe. See M 1232.
1641 France, R France Intl: News Summary. See M 1241.
1645 France, R France Intl: Arts in France. See M 1245.
1650 France, R France Intl: Insight. See M 1250.

Tuesdays

1600 Costa Rica, R Peace Intl: A Public Affair. Discussions of international issues, women's and children's issues, media and propaganda, covert actions/government secrecy and the environment.
1600 France, R France Intl: News. See S 1200.
1626 France, R France Intl: Review of the French Newspapers. See M 1225.
1631 France, R France Intl: Books. See T 1232.
1636 France, R France Intl: Land of France. See T 1246.
1641 France, R France Intl: News Headlines. See S 1230.
1645 France, R France Intl: Letter from a Listener. David Page reads letters to RFI from worldwide listeners.
1648 France, R France Intl: Drumbeat. A slice of life from the African continent and some African music.

Wednesdays

1600 Costa Rica, R Peace Intl: Alternative Radio. See M 0100.
1600 France, R France Intl: News. See S 1200.
1615 UK, BBC London (AS): Blues World. See H 0530.
1626 France, R France Intl: Review of the French Newspapers. See M 1225.
1630 France, R France Intl: News Headlines. See S 1230.
1632 France, R France Intl: France Today. See W 1232.
1634 France, R France Intl: Power and Policy. See W 1234.
1639 France, R France Intl: RFI Europe. See M 1232.
1644 France, R France Intl: News Summary. See M 1241.
1647 France, R France Intl: Letter from a Listener. See T 1645.
1650 France, R France Intl: Land of France. See T 1246.

Thursdays

1600 Costa Rica, R Peace Intl: Our Americas. See T 0100.
1600 France, R France Intl: News. See S 1200.
1626 France, R France Intl: Review of the French Newspapers. See M 1225.
1630 France, R France Intl: Sports Magazine. See M 1231.
1632 France, R France Intl: Reach Out. Reporting on efforts to overcome world problems such as the banning of land mines.
1639 France, R France Intl: News Headlines. See S 1230.
1642 France, R France Intl: Echoes from Africa. Report on or interview with someone from an African country.
1648 France, R France Intl: Discovery. See T 1237.

Fridays

1600 Costa Rica, R Peace Intl: Millennium Dreams. See S 0400.
1600 France, R France Intl: News. See S 1200.
1626 France, R France Intl: Review of the French Newspapers. See M 1225.
1630 France, R France Intl: News Headlines. See S 1230.
1631 France, R France Intl: Weekend. See F 1234.

Saturdays

1600 Costa Rica, R Peace Intl: Every Living Thing. See S 0000.
1600 France, R France Intl: News. See S 1200.
1623 France, R France Intl: Focus on France. See A 1223.
1628 France, R France Intl: Review of the French Newspapers. See M 1225.
1631 France, R France Intl: News Headlines. See S 1230.
1632 France, R France Intl: Spotlight on Africa. See A 1231.
1645 France, R France Intl: News Update. See A 1244.
1647 France, R France Intl: French Lesson. See A 1246.

FREQUENCIES

1700-1800	Afghanistan, VO Shari'ah	7075do			
1700-1800	Anguilla,Caribbean Beacon	11775am			
1700-1800 vl	Australia, ABC/Alice Spgs	2310do			
1700-1800 vl	Australia, ABC/Katherine	2485do			
1700-1800 vl	Australia, ABC/Tent Creek	2325do			
1700-1800	Australia, Radio 5995pa	9500as	9580pa	9660pa	11880pa
1700-1730	Azerbaijan, R Dada Gorgud	9165me			
1700-1800 vl	Botswana, Radio	4820do	4830do	7255do	
1700-1800 vl	Canada, CBC N Quebec Svc	9625do			
1700-1800	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZN St John's	6160do			
1700-1800	Canada, CKZU Vancouver	6160do			
1700-1756	China, China Radio Intl	5220af	7150af	7405af	9570af
		9745af			
1700-1800	Costa Rica,RF Peace Intl	15050am	21460am		
1700-1727	Czech Rep, R Prague Intl	5930eu	21745af		
1700-1800	Egypt, Radio Cairo	15255af			
1700-1800 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
1700-1730	France, Radio France Intl	11615af	15210af		
1700-1800	Germany, Deutsche Welle	6140eu			
1700-1800	Germany, Sunrise Radio	5850eu			
1700-1730 a	Germany, Universal Life	11745af			
1700-1800 a	Germany,Good News World R	11725va			
1700-1730	Germany,Overcomer Ministr	6010eu			
1700-1800 vl	Ghana, Ghana BC Corp	3366do	4915do		
1700-1800	Guyana, GBC/Voice of	3290al	5950do		
1700-1800 vl	Italy, IRRS	3985va			
1700-1800	Japan, Radio/NHK 6090as	7110eu	9535na	9825as	15355af
1700-1800	Kenya, Kenya BC Corp	4935do			
1700-1800	Lebanon, Voice of Hope	9960me			
1700-1800 vl	Lesotho, Radio	4800do			
1700-1800	Malaysia, Radio	7295do			
1700-1800	N Marianas, KFBS Saipan	9465as			
1700-1800 mtwhf	New Zealand, R NZ Intl	11675pa			
1700-1800 vl	Nigeria, Radio/Ibadan	6070do			
1700-1800 vl	Nigeria, Radio/Kaduna	4770do			
1700-1800	Nigeria, Radio/Lagos	3326do			
1700-1800	Palau, KHBN/Voice of Hope	9955as	9965as		
1700-1800 vl	Papua New Guinea, NBC	4890do			
1700-1755	Poland, Polish R Warsaw	6095eu	7285eu		
1700-1800	Romania, R Romania Intl	9510eu	11940eu	15250eu	
1700-1800	Russia,Voice of Russia WS	7340eu	9785eu	9820eu	9890eu
		12010eu	12065af		
1700-1730	S Africa, Channel Africa	17860af			
1700-1800	Sierra Leone, SLBS	5980do			
1700-1715	Swaziland, Trans World R	9500af			
1700-1800	Tanzania, Radio	5050do			
1700-1800	Uganda, Radio	4976do			
1700-1800	UK, BBC World Service	3255af	3915as	5975as	6005af
	6190af	7160as	9410eu	9510as	9630af
	9740as	11995me	12095eu	15400af	15420af
	15485eu	15575eu	17830af	17840am	
1700-1800	UK, Merlin Network One	6175eu	21550af		
1700-1800	USA, KAIJ Dallas TX	13815na	15725al		
1700-1800	USA, KTBN Salt Lk City UT	15590na			
1700-1800	USA, KWHR Naalehu HI	9930as			
1700-1800	USA, Voice of America	6040af	6110as	7125as	7215as
	9645as	9760me	11920af	12040af	15205af
	15240af	15395as	15410af	15445af	17895af
1700-1800 mtwhf	USA, Voice of America	5990as	6045as	9525as	9670as
		9795as	11955as	12005as	15255as
1700-1800	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1700-1800	USA, WGTG McCaysville GA	9400am			
1700-1800	USA, WHRI Noblesville IN	9495sa	13760na		
1700-1800	USA, WINB Red Lion PA	13790am			
1700-1800	USA, WJCR Upton KY	7490na	13595as		
1700-1800 irreg	USA, WMLK Bethel PA	9465am			
1700-1800	USA, WRNO New Orleans LA	7395na	15420al		
1700-1800	USA, WSHB Cypress Crk SC	18910af			
1700-1800	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1700-1800	USA, WYFR Okeechobee FL	15695eu	17555eu		
1700-1800	Zambia, Christian Voice	3330af	4965af		
1700-1800	Zambia, Natl BC Corp	6165do	6265do		
1700-1800 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1715-1800 vl	Libya, Voice of Africa	15235va	15415va	15435va	
1715-1745	Swaziland, Trans World R	3200af	9500af		
1730-1756	Belgium,R Vlaanderen Intl	5910eu	9925eu	11840af	13685eu
1730-1800	Guam, AWR/KSDA	11965as			
1730-1800	Netherlands, Radio	6020af	9605af		
1730-1800	S Africa, AWR Africa	12130af			
1730-1800 mtwhfa	Sweden, Radio	6065eu			
1730-1800 s	Sweden, Radio	9590eu			
1730-1800 s	UK, BBC World Service	12045as	15310as		
1730-1800	Vatican State, Vatican R	13765af	15570af	17550af	
1745-1800	Bangladesh, Bangla Betar	7185eu	7462eu	9548eu	15520eu
1745-1800	India, All India Radio	7410va	9650af	9950va	11620va
		11935af	13780af	15075af	
1800-1900	Anguilla,Caribbean Beacon	11775am			
1800-1900 mtwhf	Argentina, RAE	15345eu			
1800-1900 vl	Australia, ABC/Alice Spgs	2310do			
1800-1900 vl	Australia, ABC/Katherine	2485do			
1800-1900 vl	Australia, ABC/Tent Creek	2325do			
1800-1900	Australia, Radio	6080as	7240pa	9500as	9580pa
		9660pa	11880pa		
1800-1900	Bangladesh, Bangla Betar	7185eu	7462eu	9548eu	15520eu
1800-1900 vl	Botswana, Radio	4820do	4830do		
1800-1900	Brazil, R Nacional Bras	15265eu			
1800-1900	Canada, CFRX Toronto	6070do			
1800-1900	Canada, CFVP Calgary	6030do			
1800-1900	Canada, CHNX Halifax	6130do			
1800-1900	Canada, CKZN St John's	6160do			
1800-1900	Canada, CKZU Vancouver	6160do			
1800-1900	Costa Rica,RF Peace Intl	15050am	21460am		
1800-1830	Egypt, Radio Cairo	15255af			
1800-1900 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
1800-1900	Germany, Deutsche Welle	6140eu			
1800-1900	Germany, Sunrise Radio	5850eu			
1800-1830 s	Germany, Universal Life	11605eu			
1800-1900	Germany,Overcomer Ministr	13810eu			
1800-1900 vl	Ghana, Ghana BC Corp	3366do	4915do		
1800-1815	Greece, Voice of	7450eu	9425eu	15485na	17705sa
1800-1900	Guyana, GBC/Voice of	3290al	5950do		
1800-1900	India, All India Radio	7410va	9650af	9950va	11620va
		11935af	15075af		
1800-1900 vl	Italy, IRRS	3985va			
1800-1900	Kenya, Kenya BC Corp	4935do			
1800-1900	Kuwait, Radio	11990am			
1800-1900	Lebanon, Voice of Hope	9960me			
1800-1900 vl	Lesotho, Radio	4800do			
1800-1815	Liberia,LCN/R Liberia Int	5100do			
1800-1900	Malaysia, Radio	7295do			
1800-1900	N Marianas, KFBS Saipan	9465as			
1800-1900	N Marianas, KHBI Saipan	13820as			
1800-1830	Netherlands, Radio	6020af	9605af		
1800-1900 mtwhf	New Zealand, R NZ Intl	11675pa			
1800-1900 vl	Nigeria, Radio/Ibadan	6050do			
1800-1900 vl	Nigeria, Radio/Kaduna	4770do			
1800-1900	Nigeria, Radio/Lagos	3326do			
1800-1900 vl	Nigeria, Voice of	7255af	15120va		
1800-1900	North Korea, R Pyongyang	4405as	6575eu	9335eu	11710am
		13760am			
1800-1900	Palau, KHBN/Voice of Hope	9965as			
1800-1900 vl	Papua New Guinea, NBC	4890do			
1800-1900	Russia,Voice of Russia WS	7310eu	7340eu	9475af	9785eu
	9820eu	9890eu	12010eu	12065af	15470af
1800-1830	S Africa, AWR Africa	5960af	6100af		
1800-1830	S Africa, Channel Africa	17870af			
1800-1900	Sierra Leone, SLBS	3316do			
1800-1900 vl	Solomon Islands, SIBC	5020do			
1800-1830	Swaziland, Trans World R	3200af	9500af		
1800-1900	Tanzania, Radio	5050af			
1800-1900	UK, BBC World Service	3255af	5975as	6005as	6180eu
	6190af 6195eu	9410eu	9510as	9740pa	11995me
	12095eu 15400af	5420af	15575eu	17830af	17840am
1800-1900	UK, Merlin Network One	6175eu	21550af		
1800-1900	USA, KAIJ Dallas TX	13815na	15725al		
1800-1900	USA, KJES Vado NM	15385au			
1800-1900	USA, KTBN Salt Lk City UT	15590na			
1800-1900	USA, KWHR Naalehu HI	17510as			
1800-1900	USA, Voice of America	6035af	6040af	9760me	11920af
	11975af	13710af	15240af	15410af	15580af
1800-1830	USA, Voice of America	11740va			
1800-1900	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1800-1900	USA, WGTG McCaysville GA	9400am			
1800-1900	USA, WHRA Greenbush ME	17655af			
1800-1900	USA, WHRI Noblesville IN	9495sa	13760na		
1800-1900	USA, WINB Red Lion PA	13790am			
1800-1900	USA, WJCR Upton KY	7490na	13595as		
1800-1900 irreg	USA, WMLK Bethel PA	9465am			
1800-1900	USA, WRNO New Orleans LA	7395na	15420al		
1800-1900	USA, WSHB Cypress Crk SC	15665eu	18910af		
1800-1900	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1800-1845	USA, WYFR Okeechobee FL	15695eu			
1800-1900 vl	Vanuatu, Radio	4960do			
1800-1825	Vietnam, Voice of	5940eu	7270eu	7400eu	7440as
		9839eu	12019eu		
1800-1900	Yemen, Rep of Yemen Radio	9780do			
1800-1900	Zambia, Christian Voice	3330af	4965af		
1800-1900	Zambia, Natl BC Corp	6165do	6265do		
1800-1900 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1830-1900	Ascension Is,RTE Radio	17885af			
1830-1900	Georgia, Georgian Radio	11910eu			
1830-1900	Germany, Universal Life	11735af			
1830-1900	Netherlands, Radio 6020af	9605af	9895af	11655af	15315af
1830-1900 w	Philippines, FEBC R Intl	9465eu			
1830-1900	Serbia, Radio Yugoslavia	6100eu	9720af		
1830-1900	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	
1830-1900	Swaziland, Trans World R	3200af			
1830-1900 a	Sweden, Radio	5970va			
1830-1900	Turkey, Voice of	9630as	9655va		
1830-1900 as/vl	USA, Voice of America	9845af	13675af	15455af	
1840-1850	Greece, Voice of	12105af	15630af		
1855-1900 as	New Zealand, R NZ Intl	11675pa			

FREQUENCIES

1900-2000	Anguilla,Caribbean Beacon	11775am				
1900-2000 vl	Australia, ABC/Katherine	2485do				
1900-2000 vl	Australia, ABC/Tent Creek	2325do				
1900-2000	Australia, Radio	6080as	7240pa	9500as	9580pa	
		9660as	11880pa			
1900-2000 vl	Botswana, Radio	4820do	4830do			
1900-1920	Brazil, R Nacional Bras	15265eu				
1900-2000	Bulgaria, Radio	9400eu	11720eu			
1900-2000	Canada, CFRX Toronto	6070do				
1900-2000	Canada, CFVP Calgary	6030do				
1900-2000	Canada, CHNX Halifax	6130do				
1900-2000	Canada, CKZN St John's	6160do				
1900-2000	Canada, CKZU Vancouver	6160do				
1900-1956	China, China Radio Intl	6955af	9440af	9600af		
1900-2000	Costa Rica,RF Peace Intl	15050am	21460am			
1900-2000	Ecuador, HCJB	17725eu	21455va			
1900-2000 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af			
1900-1945	Germany, Deutsche Welle	9640af	11785af	11810af	13790af	
		15390af	17810af			
1900-2000	Germany, Sunrise Radio	5850eu				
1900-2000	Germany,Overcomer Ministr	13810eu				
1900-2000 vl	Ghana, Ghana BC Corp	3366do	4915do			
1900-1910	Greece, Voice of	7475eu	9375eu			
1900-2000	Guatemala, Adv World R	5980am				
1900-2000	Guyana, GBC/Voice of	3290al	5950do			
1900-1930	Hungary, Radio Budapest	6025eu	7170eu			
1900-1945	India, All India Radio	7410va	9650af	9950va	11620va	
		11935af	13780af	15075af		
1900-1925	Israel, Kol Israel	11605va	15640af	17545va		
1900-2000 vl	Italy, IRRS	3985va				
1900-2000	Kenya, Kenya BC Corp	4885do	4935do			
1900-2000	Kuwait, Radio	11990am				
1900-2000	Lebanon, Voice of Hope	9960me				
1900-2000 vl	Lesotho, Radio	4800do				
1900-1915	Liberia,LCN/R Liberia Int	5100do				
1900-2000	Malaysia, Radio	7295do				
1900-2000	Malta, VO Mediterranean	7440eu				
1900-2000	N Marianas, KFBS Saipan	9465as				
1900-2000	Netherlands, Radio 6020af	9605af	9895af	11655af	15310af	
1900-1951 mtwhf	New Zealand, R NZ Intl	11675pa				
1900-1958 as	New Zealand, R NZ Intl	11675pa				
1900-2000 vl	Nigeria, Radio/Ibadan	6050do				
1900-2000 vl	Nigeria, Radio/Kaduna	4770do				
1900-2000	Nigeria, Radio/Lagos	3326do				
1900-2000	Nigeria, Voice of	7255af	15120va			
1900-2000	North Korea, R Pyongyang	6520va	9600va	9975af		
1900-1930 vl	Papua New Guinea, NBC	9675do				
1900-1930 m-a/vl	Papua New Guinea, NBC	4890do				
1900-2000	Russia,Voice of Russia WS	5940eu	7340eu	9785eu	9820eu	
		9890eu	12020eu	12070eu		
1900-2000	Sierra Leone, SLBS	3316do				
1900-2000 vl	Solomon Islands, SIBC	5020do				
1900-2000	South Korea, R Korea Intl	5975as	7275as			
1900-2000	Swaziland, Trans World R	3200af				
1900-1930	Switzerland, Swiss R Intl	9885eu				
1900-1930	Tanzania, Radio	5050af				
1900-2000	Thailand, Radio	9535eu	9655eu	11905eu		
1900-1930	Turkey, Voice of	9630as	9655va			
1900-2000	Uganda, Radio	4976do				
1900-2000	UK, BBC World Service	3255af	6005af	6180eu	6180eu	
	6190af 6195eu	9410eu	9630af	9740pa	11835af	
	11995me 12095eu	15400af	15485eu	17830af		
1900-2000	UK, Merlin Network One	3965eu	6175eu	13690eu	21550af	
1900-2000	USA, KAIJ Dallas TX	13815na	15725al			
1900-2000	USA, KJES Vado NM	15385au				
1900-2000	USA, KTBN Salt Lk City UT	15590na				
1900-2000	USA, KWHR Naalehu HI	17510as				
1900-2000	USA, Voice of America	6035af	7415af	9525pa	9760me	
		11870pa	11920af	11975af	13710af	
		15180pa	15240af	15410af	15580af	
1900-1930 a	USA, Voice of America	4950af				
1900-2000	USA, WEWN Birmingham AL	11875na	13615na	15745eu		
1900-2000	USA, WGTG McCaysville GA	9400am				
1900-2000	USA, WHRA Greenbush ME	17655af				
1900-2000	USA, WHRI Noblesville IN	9495sa	13760na			
1900-2000	USA, WINB Red Lion PA	13790am				
1900-2000	USA, WJCR Upton KY	7490na	13595as			
1900-2000	USA, WRNO New Orleans LA	7395na	15420al			
1900-2000	USA, WSHB Cypress Crk SC	15665eu	18910af			
1900-2000	USA, WWCR Nashville TN	9475na	12160va	13845na	15685na	
1900-1945	USA, WYFR Okeechobee FL	15695eu				
1900-2000 vl	Vanuatu, Radio	4960do				
1900-1925	Vietnam, Voice of 5940eu	7270eu	7400eu	9840eu	12019eu	
1900-2000	Zambia, Christian Voice	3330af	4965af			
1900-2000	Zambia, Natl BC Corp	6165do	6265do			
1900-2000 vl	Zimbabwe, Zimbabwe BC	3306do	4828do			
1915-1930	Albania, R Tirana Intl	7180eu	9650eu			
1930-2000 th	Belarus, R Minsk	7210va	11960va			
1930-1956	Belgium,R Vlaanderen Intl	5960eu				
1930-2000	Georgia, Georgian Radio	11760eu				
1930-2000	Iran, VOIRI	7215eu	7260eu	9022eu		
1930-2000	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu	
1930-1900	Sweden, Radio	6065eu				
1935-1955	Italy, RAI Intl	5970eu	7120eu			
1950-2000	Vatican State, Vatican R	4005eu	5883eu	7250eu		
1952-2000	New Zealand, R NZ Intl	17675pa				
1956-2000	S Africa, Voice of Hope	6290af				

2000-2100	Algeria, R Algiers Intl	11715af	11750af			
2000-2100	Anguilla,Caribbean Beacon	11775am				
2000-2100 vl	Australia, ABC/Alice Spgs	2310do				
2000-2100 vl	Australia, ABC/Katherine	2485do				
2000-2100 vl	Australia, ABC/Tent Creek	2325do				
2000-2100	Australia, Radio 9500as	9580pa	9660as	11880pa	12080as	
2000-2100 vl	Botswana, Radio	4820do	4830do			
2000-2100	Canada, CFRX Toronto	6070do				
2000-2100	Canada, CFVP Calgary	6030do				
2000-2100	Canada, CHNX Halifax	6130do				
2000-2100	Canada, CKZN St John's	6160do				
2000-2100	Canada, CKZU Vancouver	6160do				
2000-2056	China, China Radio Intl	5220eu	6950eu	9440af	9920eu	
		11975af	15500af			
2000-2100	Costa Rica,RF Peace Intl	15050am	21460am			
2000-2027	Czech Rep, R Prague Intl	5930eu	11600as			
2000-2100	Ecuador, HCJB	17725eu	21455va			
2000-2100 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af			
2000-2045	Germany, Deutsche Welle	11970eu				
2000-2100 vl	Ghana, Ghana BC Corp	3366do	4915do			
2000-2100	Guatemala, Adv World R	5980am				
2000-2100	Guyana, GBC/Voice of	3290al	5950do			
2000-2100	Indonesia, Voice of	9525as	11765as	15510as		
2000-2030	Iran, VOIRI	7215eu	7260eu	9022eu		
2000-2100 irreg	Iraq, Radio Iraq Intl	11785va				
2000-2100 vl	Italy, IRRS	3985va				
2000-2020	Italy, RAI Intl	5970eu	7120eu			
2000-2100	Kenya, Kenya BC Corp	4885do	4935do			
2000-2100	Kuwait, Radio	11990am				
2000-2100	Lebanon, Voice of Hope	9960me				
2000-2100 vl	Lesotho, Radio	4800do				
2000-2055	Liberia,LCN/R Liberia Int	5100do				
2000-2100	Malaysia, Radio	7295do				
2000-2100 vl	Namibia, NBC	3270af	3289af			
2000-2025	Netherlands, Radio 6020af	9605af	9895af	11655af	15315af	
2000-2100	New Zealand, R NZ Intl	17675pa				
2000-2015 vl	Niger, Voice du Sahel	5019do				
2000-2100 vl	Nigeria, Radio/Ibadan	6050do				
2000-2100 vl	Nigeria, Radio/Kaduna	4770do				
2000-2100	Nigeria, Radio/Lagos	3326do				
2000-2100	Nigeria, Voice of	7255af	15120va			
2000-2100 vl	Papua New Guinea, NBC	9675do				
2000-2025	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu	
2000-2100	Russia,Voice of Russia WS	7340eu	7360eu	9820eu	9890eu	
		12020eu	12070eu			
2000-2005	S Africa, Voice of Hope	6290af				
2000-2100	Sierra Leone, SLBS	3316do				
2000-2100 vl	Solomon Islands, SIBC	5020do				
2000-2100 mtwhf	Spain, R Exterior Espana	9595af	9680eu			
2000-2045	Swaziland, Trans World R	3200af				
2000-2030	Switzerland, Swiss R Intl	13710af	13770af	15220af	17580af	
2000-2100	Uganda, Radio	4976do				
2000-2100	UK, BBC World Service	3255af	3955eu	5975pa	6005af	
	6180eu 6190af	6195va	7325eu	9410eu	9630af	
	9740pa 11835af	12095sa	15400af	17830af		
2000-2100	UK, Merlin Network One	3965eu	13690na	17695eu		
2000-2100	USA, KAIJ Dallas TX	13815na	15725al			
2000-2100	USA, KJES Vado NM	15385na				
2000-2100	USA, KTBN Salt Lk City UT	15590na				
2000-2100	USA, KWHR Naalehu HI	17510as				
2000-2100	USA, Voice of America	6035af	6095me	7415af	9760me	
		11855af	11975af	13710af	15240af	
		15410af	15580af	17725af	17755af	
2000-2100	USA, WBCQ Monticello ME	7415na				
2000-2100	USA, WEWN Birmingham AL	11875na	13615na	15745eu		
2000-2100	USA, WGTG McCaysville GA	6890na	9400am			
2000-2100	USA, WHRA Greenbush ME	15460af				
2000-2100	USA, WHRI Noblesville IN	9495na	9495sa			
2000-2100	USA, WINB Red Lion PA	13790am				
2000-2100	USA, WJCR Upton KY	7490na	13595as			
2000-2045 as	USA, WRMI/R Miami Intl	9955am				
2000-2100	USA, WRNO New Orleans LA	7395na	15420al			
2000-2100	USA, WSHB Cypress Crk SC	15665eu	18910af			
2000-2100	USA, WWCR Nashville TN	9475na	12160va	13845na	15685na	
2000-2045	USA, WYFR Okeechobee FL	15695eu	17750va	17845af		
2000-2100 vl	Vanuatu, Radio	4960do				
2000-2010	Vatican State, Vatican R	4005eu	5883eu	7250eu		
2000-2030	Vatican State, Vatican R	9660af	11625af	13765af		
2000-2100	Zambia, Christian Voice	3330af	4965af			
2000-2100	Zambia, Natl BC Corp	6165do	6265do			
2000-2100 vl	Zimbabwe, Zimbabwe BC	3306do	4828do			
2005-2100	Syria, Radio Damascus	12085eu	13605eu			
2015-2100 vl	Libya, Voice of Africa	15235va	15415va	15435va		
2025-2045	Italy, RAI Intl	7175af	9670af	11715af		
2030-2100 th	Belarus, R Minsk	7210va	11960va			
2030-2100	Cuba, Radio Havana	13720eu	13750eu			
2030-2100	Egypt, Radio Cairo	15375af				
2030-2100	Germany, AWR Europe	15560af				
2030-2035 mtwhf	Latvia, Radio Latvia Intl	5935eu				
2030-2055	Moldova, R Moldova Intl	7520eu				
2030-2100	Mongolia, Voice of	11790eu	12085eu			
2030-2100	S Africa, AWR Africa	9745af				
2030-2045	Thailand, Radio	9535eu	9655eu	11905eu		
2030-2100	Turkey, Voice of	9525va				
2030-2100 as	USA, Voice of America	4950af				
2030-2100	Uzbekistan, R Tashkent	7105eu	9540eu			
2030-2055	Vietnam, Voice of 5940eu	7270eu	7400eu	9840eu	12019eu	
2045-2100	India, All India Radio	7410eu	9650eu	9910au	9950eu	
		11620va	11715au			
2045-2100	Swaziland, Trans World R	3200af				
2045-2100 a	USA, WRMI/R Miami Intl	9955am				
2045-2100	USA, WYFR Okeechobee FL	15695na	17845va			

FREQUENCIES

2100-2200	Anguilla,Caribbean Beacon	11775am			
2100-2130 vl	Australia, ABC/Alice Spgs	2310do			
2100-2130 vl	Australia, ABC/Katherine	2485do			
2100-2200 vl	Australia, ABC/Katherine	5025do			
2100-2130 vl	Australia, ABC/Tent Creek	2325do			
2100-2200	Australia, Radio	7240as	9500pa	9660pa	11880pa
		12080as	17715pa	21740pa	
2100-2200 vl	Botswana, Radio	3356do	4820do		
2100-2200	Bulgaria, Radio	9400eu	11720eu		
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2159	Canada, R Canada Intl	5995af	7235af	9770af	9805af
	11945af	13650af	13690af	15150af	17820af
2100-2156	China, China Radio Intl	7170eu			
2100-2127	China, China Radio Intl	5220eu	6950eu	9920eu	11975eu
		15500af			
2100-2200	Costa Rica,RF Peace Intl	15050am	21460am		
2100-2130	Cuba, Radio Havana	13720eu	13750eu		
2100-2200	Ecuador, HCJB	17725eu	21455va		
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
2100-2145	Germany, Deutsche Welle	9670as	9765as	9875af	11865af
		11915as	13780as	15135va	
2100-2200 vl	Ghana, Ghana BC Corp	3366do	4915do		
2100-2200	Guyana, GBC/Voice of	3290al	5950do		
2100-2130	Hungary, Radio Budapest	6025eu			
2100-2200	India, All India Radio	7410eu	9650eu	9910au	9950eu
		11620va	11715au		
2100-2200 vl	Italy, IRRS	3985va			
2100-2200	Japan, Radio/NHK	6035pa	9725eu	11850pa	13630na
2100-2130	Kenya, Kenya BC Corp	4885do	4935do		
2100-2200 vl	Lesotho, Radio	4800do			
2100-2115	Liberia,LCN/R Liberia Int	5100do			
2100-2200	Malaysia, Radio	7295do			
2100-2200 vl	Namibia, NBC	3270af	3289af		
2100-2200	New Zealand, R NZ Intl	17675pa			
2100-2200 vl	Nigeria, Radio/Ibadan	6050do			
2100-2200 vl	Nigeria, Radio/Kaduna	4770do			
2100-2200	Nigeria, Radio/Lagos	3326do			
2100-2200	North Korea, R Pyongyang	4405as	6575eu	9335eu	11710am
		13760am			
2100-2200	Palau, KHBN/Voice of Hope	9985as			
2100-2200 vl	Papua New Guinea, NBC	9675do			
2100-2200	Romania, R Romania Intl	7105eu	9550eu	9690eu	
2100-2130	Serbia, Radio Yugoslavia	6100eu	6185eu		
2100-2200	Sierra Leone, SLBS	3316do			
2100-2200 vl	Solomon Islands, SIBC	5020do			
2100-2130	South Korea, R Korea Intl	6480eu			
2100-2200	South Korea, R Korea Intl	15575eu			
2100-2200	Swaziland, Trans World R	3200af			
2100-2200	Syria, Radio Damascus	12085na	13605na		
2100-2130	Turkey, Voice of	9525va			
2100-2200	UK, BBC World Service	3255af	3915as	3955eu	5965as
	5975va 6005af	6180eu	6190af	6195va	7325eu
	9410eu 9740pa	11835af	11945as	12095sa	15400af
2100-2200	UK, Merlin Network One	13690na	17695eu		
2100-2200	Ukraine, R Ukraine Intl	4820eu	5905eu	6020eu	6080eu
	7150na 7205eu	7380eu	7420eu	9560eu	9610na
2100-2200	USA, KAIJ Dallas TX	13815na	15725al		
2100-2200	USA, KTBN Salt Lk City UT	15590na			
2100-2200	USA, KWHR Naalehu HI	17510as			
2100-2200	USA, Voice of America	6035af	6040me	6095me	7415af
	11870pa 11975af	13710af	15185pa	15240af	15410af
	15580af 17725af	17735pa			
2100-2200	USA, WBCQ Monticello ME	7415na			
2100-2200	USA, WEWN Birmingham AL	5825na	13615na	15745eu	
2100-2200	USA, WGTG McCaysville GA	6890na	9400am		
2100-2200	USA, WHRA Greenbush ME	15460af			
2100-2200	USA, WHRI Noblesville IN	5745na	9495sa		
2100-2200	USA, WINB Red Lion PA	13790am			
2100-2200	USA, WJCR Upton KY	7490na	13595as		
2100-2130 a	USA, WRMI/R Miami Intl	9955am			
2100-2200	USA, WRNO New Orleans LA	7395na	15420al		
2100-2200	USA, WSHB Cypress Crk SC	11890af	15665eu		
2100-2200	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
2100-2200	USA, WYFR Okeechobee FL	15215eu	15695af	17845va	
2100-2200 vl	Vanuatu, Radio	4960do			
2100-2200	Zambia, Christian Voice	3330af	4965af		
2100-2200	Zambia, Natl BC Corp	6165do	6265do		
2100-2200 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
2115-2145 mtwhfa	Armenia, Voice of	4810va	9965va		
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130 mtwhf	UK, BBC Caribbean Report	5975ca	15390ca	17715ca	
2115-2130 as	UK, BBC World Service	5975am			
2130-2200	Albania, R Tirana Intl	7160eu			
2130-2200 vl	Australia, ABC/Tent Creek	4910do			
2130-2200	Austria, R Austria Intl	6155eu			
2130-2200 smtwha	Austria, R Austria Intl	5945eu	13730af		
2130-2157	Czech Rep, R Prague Intl	11600as	15545af		
2130-2200	Guam, AWR/KSDA	15550as			
2130-2200	Hungary, Radio Budapest	3975eu			
2130-2200	Iran, VOIRI	6165au	9725as		
2130-2155	Moldova, R Moldova Intl	7520eu			
2130-2200	Sweden, Radio	6065eu	9430eu		
2130-2145 tf	UK, BBC Calling Falklands	11680sa			

2200 UTC

2200-2300	Anguilla,Caribbean Beacon	6090am			
2200-2300 vl	Australia, ABC/Katherine	5025do			
2200-2300 vl	Australia, ABC/Tent Creek	4910do			
2200-2300	Australia, Radio	17715pa	17795pa	21740pa	
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2229	Canada, R Canada Intl	5995af	7235af	9770af	9805af
		11705as	11945af	13690af	15150af
2200-2300	Costa Rica,RF Peace Intl	15050am	21460am		
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
2200-2300 vl	Ghana, Ghana BC Corp	3366do	4915do		
2200-2300	Guyana, GBC/Voice of	3290al	5950do		
2200-2230	India, All India Radio	7410eu	9650eu	9910au	9950eu
		11620va	11715au		
2200-2230	Iran, VOIRI	6165au	9725as		
2200-2225	Italy, RAI Intl	5990as	9675as	11900as	
2200-2215	Liberia,LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2230	Mexico, Radio Mexico Intl	5985al	9705am		
2200-2225	Moldova, R Moldova Intl	7520eu			
2200-2300 vl	Namibia, NBC	3270af	3289af		
2200-2300	New Zealand, R NZ Intl	17675pa			
2200-2300 vl	Nigeria, Radio/Ibadan	6050do			
2200-2300 vl	Nigeria, Radio/Kaduna	4770do			
2200-2300	Nigeria, Radio/Lagos	3326do			
2200-2300	Palau, KHBN/Voice of Hope	9985as			
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2300	Sierra Leone, SLBS	3316do			
2200-2300 vl	Solomon Islands, SIBC	5020do			
2200-2230	South Korea, R Korea Intl	3980eu			
2200-2300 as	Spain, R Exterior Espana	9595af	9680eu		
2200-2215	Swaziland, Trans World R	3200af			
2200-2205	Syria, Radio Damascus	12085eu	13605na		
2200-2300	Taiwan, Radio Taipei Intl	15600eu	17750eu		
2200-2300	Turkey, Voice of	7280eu	9655va		
2200-2300	UK, BBC World Service	5965as	5975am	6175am	6195va
	7110as 9590am	9660as	9890as	9915sa	11835af
	11955as 12080pa	12095sa	15400af		
2200-2300	UK, Merlin Network One	3985eu	9850as	11985na	
2200-2300	USA, KAIJ Dallas TX	13815na	15725al		
2200-2300	USA, KTBN Salt Lk City UT	15590na			
2200-2300	USA, KWHR Naalehu HI	17510as			
2200-2300	USA, Voice of America	7215as	9770as	9890as	11760as
	15185as	15290as	15305as	17735pa	17820as
2200-2230 mtwhf	USA, Voice of America	6035af	7415af	11975af	12080af
		13710af			
2200-2300	USA, WBCQ Monticello ME	7415na			
2200-2300	USA, WEWN Birmingham AL	5825na	5850eu	9975eu	13615na
2200-2300	USA, WGTG McCaysville GA	5085am	6890na		
2200-2300	USA, WHRA Greenbush ME	13760af			
2200-2300	USA, WHRI Noblesville IN	5745na	9495sa		
2200-2300	USA, WINB Red Lion PA	13790am			
2200-2300	USA, WJCR Upton KY	7490na	13595as		
2200-2230 a	USA, WRMI/R Miami Intl	9955am			
2200-2300	USA, WRNO New Orleans LA	7395na	15420al		
2200-2300	USA, WSHB Cypress Crk SC	13770eu	15285sa		
2200-2300	USA, WWCR Nashville TN	5070na	7435na	9475na	13845na
2200-2245	USA, WYFR Okeechobee FL	11740na	15215af	17845va	
2200-2300 vl	Vanuatu, Radio	4960do			
2200-2210	Zambia, Natl BC Corp	6165do	6265do		
2230-2256	Belgium,R Vlaanderen Intl	15565na			
2230-2300	Cuba, Radio Havana	9550am			
2230-2257	Czech Rep, R Prague Intl	11600na	15545na		
2240-2250	Greece, Voice of	7475au	9425au		
2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
2245-2300	USA, WYFR Okeechobee FL	11740na			
2245-2300	Vatican State, Vatican R	7305au	9595au	11830au	

Frequencies

2300-0000	Anguilla,Caribbean Beacon	6090am			
2300-0000 vl	Australia, ABC/Katherine	5025do			
2300-0000 vl	Australia, ABC/Tent Creek	4910do			
2300-0000	Australia, Radio	9660pa	12080as	17715pa	17795pa
		21740pa			
2300-0000	Bulgaria, Radio	9400na	11700na		
2300-0000	Canada, CBC N Quebec Svc	9625do			
2300-0000	Canada, CFRX Toronto	6070do			
2300-0000	Canada, CFVP Calgary	6030do			
2300-0000	Canada, CHNX Halifax	6130do			
2300-0000	Canada, CKZN St John's	6160do			
2300-0000	Canada, CKZU Vancouver	6160do			
2300-2329	Canada, R Canada Intl	5960am	6040am	9535am	9755am
		11865am			
2300-0000	Costa Rica,RF Peace Intl	15050am	21460am		
2300-2330	Cuba, Radio Havana	9550am			
2300-0000	Egypt, Radio Cairo	9900am			
2300-2345	Germany, Deutsche Welle	9715as	9815as	11965as	
2300-0000 s	Germany,Good News World R	9405sa			
2300-0000 vl	Ghana, Ghana BC Corp	3366do	4915do		
2300-0000	Guyana, GBC/Voice of	3290al	5950do		
2300-0000	India, All India Radio	7410as	9705as	9950as	11620as
2300-2315	Liberia,LCN/R Liberia Int	5100do			
2300-0000	Malaysia, Radio	7295do			
2300-2330	Mexico, Radio Mexico Intl	5985al	9705am		
2300-2325	Moldova, R Moldova Intl	7520eu			
2300-0000 vl	Namibia, NBC	3270af	3289af		
2300-0000	New Zealand, R NZ Intl	17675pa			
2300-2330 vl	Nigeria, Radio/Ibadan	6050do			
2300-2330 vl	Nigeria, Radio/Kaduna	4770do			
2300-2330	Nigeria, Radio/Lagos	3326do			
2300-0000	North Korea, R Pyongyang	4405as	11335am	13760am	15130am
2300-0000	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	
2300-0000 vl	Papua New Guinea, NBC	9675do			
2300-0000	Romania, R Romania Intl	6130eu	7195eu	9570na	11830na
2300-0000	Sierra Leone, SLBS	3316do			
2300-0000	Singapore,RCorp Singapore	6150do			
2300-0000 vl	Solomon Islands, SIBC	5020do			
2300-0000	UK, BBC World Service	3915as	5965as	5975am	6035as
		6175am	6195as	7110as	9590am
		9915sa	11945as	11955as	12095sa
		15280as			
2300-0000	UK, Merlin Network One	3985eu	9850as	11985na	
2300-0000	Ukraine, R Ukraine Intl	4820eu	5905eu	6020eu	7205eu
		7420eu			
2300-0000	USA, KAIJ Dallas TX	13740al	13815na	15725al	
2300-0000	USA, KTBN Salt Lk City UT	15590na			
2300-0000	USA, KWHR Naalehu HI	17510as			
2300-0000	USA, Voice of America	7215as	9770as	9890as	11760as
		15185as	15290as	15305as	17735pa
		17820as			
2300-0000	USA, WBCQ Monticello ME	7415na			
2300-0000	USA, WEWN Birmingham AL	5825na	5850eu	9975eu	13615na
2300-0000	USA, WGTG McCaysville GA	5085am	6890na		
2300-0000	USA, WHRA Greenbush ME	13760af			
2300-0000	USA, WHRI Noblesville IN	5745na	9495sa		
2300-0000	USA, WINB Red Lion PA	13790am			
2300-0000	USA, WJCR Upton KY	7490na	13595as		
2300-0000	USA, WRNO New Orleans LA	7355na	15420al		
2300-0000	USA, WSHB Cypress Crk SC	13770va	15285am		
2300-0000 as	USA, WWBS Macon GA	11900na			
2300-0000	USA, WWCR Nashville TN	5070na	7435na	9475na	13845na
2300-2345	USA, WYFR Okeechobee FL	11740na			
2300-0000 vl	Vanuatu, Radio	4960do			
2300-2305	Vatican State, Vatican R	7305au	9595au	11830au	
2310-2320	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
2315-0000 vl	Libya, Voice of Africa	15235va	15415va	15435va	
2330-2359 as	Canada, R Canada Intl	6040am	9535am	11865am	
2330-2359	Canada, R Canada Intl	5960na	9755na		
2330-0000 vl	Guatemala, Radio Cultural	3300do			
2330-2335	Israel, Kol Israel	11585af	15615af	15640na	
2330-0000	Malaysia, RTM Sarawak	7160do			
2330-0000	Netherlands, Radio	6165na	9845na		
2330-2355	Vietnam, Voice of	5940af	7270af	7400af	9840am
		12019am			
2340-2350	Greece, Voice of	7450sa	9400sa	11645sa	

Selected Programs

Sundays

2300 Costa Rica, R Peace Intl: World of Radio. See S 0200.
2345 Costa Rica, R Peace Intl: Hightower Radio. A commentary by Jim Hightower, the provocative progressive voice from Texas, on national issues.
2355 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
2357 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.

Mondays

2300 Costa Rica, R Peace Intl: New Dimensions Radio. Conversations with innovative thinkers whose ideas are on the leading edge of change.
2330 Costa Rica, R Peace Intl: The Neumaier Report. Poughkeepsie NY columnist, Dr John Neumaier, comments on a wide variety of socially relevant issues.
2330 Costa Rica, R Peace Intl: The Tico Times Report. The most important news from Central America as reported in The Tico times in Costa Rica.
2345 Costa Rica, R Peace Intl: UN Daily News. A daily news feed from the United Nations News Service reporting on UN activites around the world.
2350 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
2352 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.

Tuesdays

2300 Costa Rica, R Peace Intl: University of the Air. Self-directed and participatory learing of a variety of courses.
2330 Costa Rica, R Peace Intl: UN Perspective. A weekly program of political, economic and social issues.
2345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
2350 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
2352 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.

Wednesdays

2300 Costa Rica, R Peace Intl: University of the Air. See T 2300.
2330 Costa Rica, R Peace Intl: Women. A program for and about women from United Nations Radio.
2345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
2350 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
2352 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.

Thursdays

2300 Costa Rica, R Peace Intl: University of the Air. See T 2300.
2345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
2350 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
2352 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.

Fridays

2300 Costa Rica, R Peace Intl: University of the Air. See T 2300.
2345 Costa Rica, R Peace Intl: UN Daily News. See M 2345.
2350 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
2352 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.

Saturdays

2300 Costa Rica, R Peace Intl: This Way Out. See S 1500.
2330 Costa Rica, R Peace Intl: The World in Review. Recapping the news from the UN during the preceding week.
2345 Costa Rica, R Peace Intl: Hightower Radio. See S 2345.
2350 Costa Rica, R Peace Intl: Earthwatch Radio. See S 1550.
2352 Costa Rica, R Peace Intl: Earth and Sky. See S 1552.

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Thank You...

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Bibliography on the Sun and Related Subjects. (Part 2/2)

The Geomagnetic Field

Introduction to Geomagnetic Fields, Wallace Campbell, being published by Cambridge University Press, 1996. An excellent summary of geomagnetism written by one of the leading experts in the field.

The Ionosphere, HF Propagation and Prediction

"IPS User Training Course," published by IPS Radio and Space Services, Sydney Australia. A guide to the sun and solar terrestrial environment with emphasis of its effects on HF communications.

The New Shortwave Propagation Handbook, George Jacobs, Theodore Cohen and Robert Rose, published by CQ Communications, 1995, ISBN 0-943016-11-8. A guide to all aspects of HF radio propagation.

Sun, Earth and Radio - An introduction to the ionosphere and magnetosphere, J. Ratcliffe, published by World University Library, ISBN 303 17895 7, 1970. Might be hard to obtain but a good introduction to the ionosphere and magnetosphere specific to HF propagation.

Ionospheric Radio, Ken Davies, published as IEE Electromagnetic Waves Series No, 31, Peter Peregrinus Publication, London 1990. An intermediate level book; one of the classics on the subject.

Radio Amateurs Guide to the Ionosphere, Leo McNamara, published by Krieger Publishing Co., Florida, 1994. An excellent guide to the subject.

Radiowave Propagation, Hall and Barclay (Editors), IEE Electromagnetic Waves Series No, 30, Peter Peregrinus Publication, London 1986. Covers radio propagation across the spectrum from longwave to satellite frequencies (intermediate level).

HF communication: science and technology, J. Goodman, Van Nostrand Reinhold, New York 1992. Not only the sun-earth environment but the ionosphere, HF propagation and technologies for managing it (intermediate level).

Auroras

The Aurora Watchers Handbook, Neil Davis, published by University of Alaska Press, 1992, ISBN 0-912006-59-5. An excellent book on an interesting subject

The Northern Light, Asgeir Brekke and Alv Engeland, published by Springer-Verlag, ISBN 3-540-12429-2, 1983. Coffee table historical survey of how we came to appreciate the aurora. Worth reading.

Solar and Astronomical Calculations

Astronomical Algorithms, Jan Meeus, published by Willmann-Bell, 1991, ISBN 0-943396-35-2. The definitive guide to astronomical calculations using a small computer. Includes methods of calculating co-ordinates of the sun.

There are obviously more books on these subjects, but the above list will at least give you a start and help you stock up on reading material for next winter season! Now that summer is coming, do not forget to safeguard your receiver from the effects of thunderstorms: ground your antenna when you are not using your radio equipment.

And while you are working in the garden, look at the possibility of improving your antenna system. The quality of your reception is dependent on the quality of your antenna system. No matter how much money you have paid for your receiver, if your antenna is not properly installed, the reception will be poor.

OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 May to 14 June 1999 Flux=177 SSN=138

Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
SOUTH AMERICA	22	22	23	21	20	19	18	17	17	16	15	14	14	17	19	20	21	21	22	23	23	23	22	22
WESTERN EUROPE	15	14	13	12	11	11	12	12	12	*	*	*	*	*	15	17	18	18	17	17	17	17	17	16
EASTERN EUROPE (P)	14	14	15	15	15	16	15	13	*	*	*	*	*	*	14	15	16	16	16	16	16	15	15	14
MEDITERRANEAN	19	19	19	18	18	17	15	14	*	*	*	*	*	15	16	17	18	18	19	19	19	19	19	19
MIDDLE EAST (P)	15	16	18	19	18	18	16	*	*	*	*	*	*	*	15	17	19	20	20	18	18	18	16	15
CENTRAL AFRICA	19	19	19	17	14	13	15	14	14	*	*	*	*	*	17	19	20	21	22	22	22	21	20	19
SOUTH AFRICA	13	12	11	9	9	8	13	15	15	14	*	*	*	16	17	19	21	21	22	22	20	18	16	15
SOUTH EAST ASIA (P)	20	19	18	19	19	19	18	16	15	14	13	12	12	12	13	15	17	19	20	21	19	18	17	21
FAR EAST	19	17	17	17	18	17	16	15	13	13	12	11	11	11	12	14	15	15	14	15	17	18	19	19
AUSTRALIA	23	24	24	24	24	22	20	19	18	18	18	16	15	14	14	14	13	*	*	*	16	23	24	24
TO/FROM US MIDWEST																								
SOUTH AMERICA	20	20	20	19	18	17	16	16	16	14	13	13	15	17	19	19	20	21	21	22	21	21	20	20
WESTERN EUROPE	17	16	15	14	13	13	13	13	12	*	*	*	14	16	17	17	18	18	17	17	18	18	18	18
EASTERN EUROPE	14	14	14	15	15	14	13	*	*	*	*	*	*	15	15	15	16	16	16	16	16	16	15	15
MEDITERRANEAN	19	20	19	18	17	15	14	13	*	*	*	*	*	16	17	18	18	19	19	19	19	19	19	18
MIDDLE EAST (P)	15	15	17	18	18	15	*	*	*	*	*	*	*	16	18	19	20	21	21	20	18	18	17	16
CENTRAL AFRICA	20	21	20	17	14	13	16	15	15	*	*	*	16	17	19	21	21	22	22	22	21	20	19	19
SOUTH AFRICA	13	12	11	9	9	8	13	16	15	14	13	14	17	19	20	21	22	22	22	22	20	18	16	15
SOUTH EAST ASIA (P)	18	17	18	19	18	17	15	*	*	*	*	11	12	13	16	18	19	20	21	21	19	18	17	20
FAR EAST	17	17	18	18	18	17	15	14	13	12	11	11	11	12	14	15	15	15	15	16	16	17	18	18
AUSTRALIA	22	22	23	23	21	19	18	16	16	16	15	14	13	14	14	14	13	*	*	*	16	22	22	22
TO/FROM US EAST COAST																								
SOUTH AMERICA	18	18	17	16	16	15	15	14	13	12	12	14	17	17	18	18	19	20	20	20	19	19	19	18
WESTERN EUROPE	15	14	14	13	12	12	12	12	11	11	12	14	16	18	19	19	19	18	17	17	18	17	17	17
EASTERN EUROPE	14	13	13	13	14	12	12	*	*	*	*	14	16	18	18	17	18	19	19	18	17	16	15	15
MEDITERRANEAN	19	19	18	16	15	15	14	12	*	*	*	15	16	17	17	18	18	18	18	18	18	18	18	19
MIDDLE EAST (P)	16	16	17	17	15	14	*	*	*	*	*	15	16	17	18	19	19	19	19	19	19	19	18	17
CENTRAL AFRICA	22	22	20	17	15	13	16	15	14	15	17	19	20	21	21	22	22	22	22	22	21	20	21	22
SOUTH AFRICA	13	13	10	9	8	8	14	15	14	14	17	19	20	21	21	22	22	22	22	21	20	18	16	15
SOUTH EAST ASIA (P)	19	19	18	17	15	*	*	*	*	*	*	14	16	18	20	20	21	21	21	21	20	18	17	18
FAR EAST	18	18	18	18	17	15	13	13	12	11	12	13	14	16	16	16	16	16	15	16	17	18	18	18
AUSTRALIA	20	21	21	20	18	17	16	16	16	15	14	14	15	14	14	14	*	*	*	*	16	21	20	20

* *Unfavorable conditions: Search around the last listed frequency for activity.*

(P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.

As you will notice from the frequencies listed in the forecast chart, the value of the OWF (Optimum Working Frequency) is rapidly escalating. Remember that the OWF is about 80% of the MUF (Maximum Usable Frequency), so you can always go up and see what is up there. As a guide, multiply the frequency value that you see in the chart for a particular circuit and time by 1.20 and you will have the approximate value of the MUF for that same circuit at that particular time. There is nothing that says that there is nothing up there, so go and see!

There is some DX time left before the heavy static starts, so enjoy.

John Figliozzi
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One for the Veteran Listener

Last month, we did a column for the beginner. It's only fair, then, that we should attempt to provide something of equal value for the longtime listener.

Some months back, I wrote two feature articles for this magazine that highlighted the changing environment for international broadcasters in general and looked at how one such broadcaster—Radio Australia—was responding to those changes.

As oxymoronic as it may sound, change is the only constant in life—even in shortwave. The veteran listener might like to hold to the impression that things only started changing lately, but that is just not so. Today's changes may be coming more rapidly—and seemingly less intelligently at times—but over the years continual efforts have been made to make receivers work better, transmitters operate more efficiently, and programs more accessible to listeners.

Nonetheless, it is both fun and instructive to look back with a certain sense of nostalgia on what has been. Each of us has our own sense of a "golden age" of shortwave radio. For me, it's the mid and late '60s when my hobby was new (and, quite frankly, I was too!)

Recently, I came into possession of some mid and late '60s editions of ***The World Radio-TV Handbook***. Paging through them I was able to recall receiver manufacturers like **Braun**, **Collins**, **Eddystone**, **Hammarlund**, **Loewe Opta**, **National** and **Zenith**, as well as today's more familiar names **Grundig**, **Phillips** and **Sony**. But holding an interest in programming as I do, I was fascinated more by notations of the programs on offer during that period. It brought back more than a few fond memories.

I remember my first impressions of the programs I heard back then. I thought that many were rather "old-fashioned" sounding—even for the times. They were certainly a departure from the usual fare that American radio aimed at teenagers of the day. But before long this contrast began to develop its own certain charm.

So, for a little "retro" fun, this page this month has a little matching game based on what was on offer on shortwave some thirty years ago. Answers will appear next month. (OOH! A cliff hanger!)

Some Things I Should've Said

I've done this before, so regular readers of this column won't be surprised that I've looked back over my past few months' work and found it wanting in one respect or other.

The "Fishing" columns were meant to provide some ideas for those attempting to get some timely information about the programming aired by international broadcasters. In doing so, however, I should've also advised that two North American club publications have regular monthly columns that not only provide some listening suggestions, but also present intelligent critiques of programs and station policies.

Richard Cuff edits the *Easy Listening* column for **The Journal of the North American Shortwave Association**; Fred Waterer prepares *Listening In* for **DX Ontario**, the monthly magazine of the **Ontario DX Association**. Both clubs should get full marks for having the foresight to provide a place within their organizations for those whose interests run toward the content of broadcasts, in addition to the "thrill of the chase" of DXing. Both Richard and Fred are most generous in sharing their considerable experience and expertise in this realm and, in doing so, they not only provide valuable assistance to listeners, but to the stations as well.

If you live in—or, like me, in reasonable proximity to—Ontario, **DX Ontario** might provide the most useful four page centerpiece of any publication. Ivan Grishin maintains a series of bar graphs providing times and frequencies best heard in Ontario for all of the U.S.-based shortwave stations (on the first page) and for international shortwave stations (on the second page).

Ivan also updates a daily list (again with times and frequencies best heard in Ontario and its environs) of media programs on the third page. The fourth page is devoted to the BBC, with Ivan using the top half for some BBC programming highlights for the month and Andrew Reid using the bottom half for a comprehensive check of times and frequencies (again in bar graph format) that the various World Service streams are heard in and around Ontario.

To get a sample copy of *The Journal*, send $2 to NASWA, 45 Wildflower Rd., Levittown, PA 19057. For a sample of *DX Ontario*, send $3 to ODXA, Box 161—Station A, Willowdale, ON M2N5S8.

Finally, in last month's column, I tried to give some quick suggestions on music. It was such a small effort that it was bound to fall short. We'll devote an entire future column to music on shortwave, but in the meantime, in addition to the suggestions made last month, try the **Voice of Turkey** (on 7190, 7300, 9445, 9460, 9505, 11725 and 11810 kHz. at different times of the day) and the **Voice of Greece** (on 6260, 7430, 9420, 9935, 15175, 15650 at different times of the day) in their native languages. For two countries often at odds, their music is equally exotic and festive and both stations play a lot of it!

Until June, good listening!

A '60S SHORTWAVE MATCH GAME

Match each of the three columns to include the program, station on which it was broadcast, and a personality associated with the program. Give yourself one point for each correct answer with bonus points if you can (1) remember the day or days of the week the program aired; (2) give the present-day name for the stations on the list. Top score will be 60 points.

Two cautions: while all of the programs and personalities have matches, not all of the stations do! Some the stations may have more than one program and personality associated with them. Good luck!

Programs	Stations	Personalities
Saturday Special	Radio Nederland	Hill Edell
_____ Calling DXers	Radio RSA	Keith Glover
Radio Newsreel	Switzerland Calling	Arthur Cushen
Happy Station	Radio Sweden	Various station staff
Listeners' Choice	Radio Peking	Roger Wallis
This World We Live In	Radio Canada	Arne Skoog
_____ Shortwave Merry-Go-Round	Radio New Zealand	Dody Cowan
My Favorite Spot	O.R.T.F.	Bob Thomann
His and Hers	Radio Australia	Eddie Startz
_____ Shortwave Club	Radio New York Worldwide (WNYW)	Les Marchak
The Worldwide Hit Parade	BBC	Pip Duke
_____ DX World	Radio Moscow	

AUDIO SUBCARRIERS

By Robert Smathers, roberts@nmia.com

Audio frequencies in MHz. All satellite/transponder coordinates are C-band unless otherwise noted.
DS=Discrete Stereo

Classical Music		
SuperAudio–Classical Collections	G5, 21	6.30/6.48 (DS)
WCPE-FM (89.7) Raleigh/Durham/Chapel Hill, NC	G5, 7	5.58/6.12 (DS)
WFMT-FM (98.7) Chicago, IL–Fine Arts	G5, 7	6.30/6.48 (DS)
WQXR-FM (96.3) New York, NY	S4, 14	6.20/6.80 (DS)
Satellite Computer Services		
Superguide	G5, 7	5.48
Contemporary Music		
Radio Desjardins 1	T5, 14	6.80
Radio Desjardins 2	T5, 14	6.20
SuperAudio–*Light and Lively Rock*	G5, 21	5.96, 6.12 (DS)
WBES-FM (94.5) "Charleston's Soft Rock B94.5" Charleston, WV	GE1, 12	5.90
WPHZ-FM (96.9) Bremen, IN (South Bend market)	G6, 15	6.48, 7.30 (DS)
Country Music		
SuperAudio–*American Country Favorites*	G5, 21	5.04/7.74 (DS)
WSM-AM (650) Nashville, TN	C4, 24	7.38, 7.56
Easy Listening Music		
FCC mandated safe-harbor program audio-easy listening music	G3R, 9	6.80
	G5, 2	6.80
SuperAudio–*Soft Sounds*	G5, 21	5.58/5.76 (DS)
United Video–easy listening music	C4, 8	5.895 (N)
Foreign Language Programming		
Antenna Radio (Greek)	S4, 14	7.80
Arab Network of America radio network	GE2, 22	5.80
La Cadena CNN Radio Noticias (CNN Radio News in Spanish)	G5, 17	7.56
KAZN-AM (1300) Pasadena, CA– Radio Chinese (Chinese)	GE1, 22 (Ku-band)	5.80, 6.20
Radio Sedaye Iran	GE3, 15	6.16
Radio Tropical	GE1, 1	7.60
SRC AM Network	E2, 1	7.38
SRC FM Network	E2, 1	5.41/5.58 (DS)
Unidentified Los Angeles area ethnic radio station	GE-1, 22 (Ku-band)	7.78
WCRP-FM (88.1) Guyama, PR–religious (Spanish)	G6, 6	6.53
Jazz Music		
KLON-FM (88.1) Long Beach, CA., ID-*Jazz-88*	G5, 2	5.58/5.76 (DS)
Superaudio–*New Age of Jazz*	G5, 21	7.38/7.56 (DS)
News and Information Programming		
Broadcast News	E2, 1	5.78
Cable Radio Network	G5, 2	7.24 (N)
	G5,2	8.30
	G7,6	7.30
CNN Headline News	G5, 22	7.58
CNN Radio News	G5, 5	7.58
	G5,5	6.30
	G5, 22	6.30
USA Radio Network–news, talk and information	GE3, 13	5.01 , 5.20
WCBS-AM (880) New York, NY–news	G7, 19	7.38
WCCO-AM (830) Minneapolis, MN	GE3, 6	6.20
Religious Programming		
Ambassasor Inspirational Radio	GE3, 15	5.96, 6.48
Brother Staire Radio	G5, 6	6.48
KHCB-FM (105.7) Houston, TX	GE1,9	7.28
LDS Radio Network	C1, 6	5.58
Radio 74 International	G3R, 23	5.58
Salem Radio Network	GE3, 17	5.01, 5.20
Trinity Broadcasting radio service	G5, 3	5.58/5.78 (DS)
WROL-AM (950) Boston, MA (occasional Spanish)	GE3, 3	6.20
Rock Music		
SuperAudio–*Classic Hits*-oldies	G5, 21	8.10/8.30 (DS)
SuperAudio–*Prime Demo*-mellow rock	G5, 21	5.22/5.40 (DS)
Shortwave Broadcasters via Satellite		
C-SPAN Audio 1: Various shortwave broadcasters	C3, 7	5.20
C-SPAN Audio 2: British Broadcasting Corporation (BBC)	C3, 7	5.41
Deutsche Welle	GE1, 22	7.38, 7.56, 7.74, 7.92
RAI Satelradio Italy (Italian)	G7, 14	7.38
WEWN–Worldwide Catholic Radio, Vandiver, AL	G1R, 11	5.40, 7.20, 7.38 (English), 5.58 (Spanish)
WHRA Africa/Middle East– World Harvest Radio, South Bend, IN	G6, 15	7.82
WHRI Americas– World Harvest Radio, South Bend, IN	G6, 15	7.46
WHRI Europe – World Harvest Radio, South Bend, IN	G6, 15	7.55
KWHR Asia– World Harvest Radio, South Bend, IN	G6, 15	7.64
KWHR South Pacific– World Harvest Radio, South Bend, IN	G6, 15	7.73
World Radio Network: WRN1 North America	G5, 6	6.80
World Radio Network: WRN2 North America	G5, 6	6.20 (Multi-lingual)
Sports		
Anaheim Angels Baseball Radio Network	C1,7	7.38
L.A. Kings Hockey Radio Network	C1,7	7.38
Madison Square Garden Network (MSG) Spanish Language S.A.P. (occ)	C4, 6	6.20
Speciality Formats		
Aries In Touch Reading Service	C4,10	7.87
Colorado Talking Book Network	C1,3	5.60
SuperAudio–Big Bands (Sun 0200-0600 UTC)	G5, 21	5.58/5.76 (DS)
Weather Channel–background music	C3, 13	7.78
Wisdom Radio Network	GE1, 12	7.10
Yesterday USA–nostalgia radio	G5, 7	6.80
Talk Programming		
American Freedom radio network	S4, 19	5.80
Amerinet Broadcasting	G1R, 17	5.58
Business Radio Network	C4, 10	8.06
For the People radio network	C1, 6	7.50
Friday Night Live (Fridays)	GE1, 12	5.70 (N)
	S4, 16	5.80
Orbit 7 Radio Network	C1, 14	7.48
Radio America Network	C1, 2	5.58
Republic Radio International	G7, 14	7.70
Talk America Radio Network #1–talk programs	GE3, 9	6.80
Talk America Radio Network #2–talk programs	GE3, 9	5.41
Talk Radio Network (TRN)	C1, 14	5.80
Truth Radio	S4, 19	7.56
TVRO.NET (featuring Keith Lamonica)	S4, 16	5.80
United Broadcasting Network	C1, 2	7.50
W0KIE Radio Network	GE1, 12	5.70 (N)
WWTN-FM (99.7) Manchester, TN–news and talk	G5, 18	7.38, 7.56
Variety Programming		
CBM-FM (88.5) Montreal, PQ Canada– variety/fine arts	E2, 1	6.12
KBVA-FM (106.5) Bella Vista, AR., ID-*Variety 106.5*	G6, 6	5.58/5.76 (DS)
West Virginia Public Radio	GE1, 12	7.74
WNMX-FM (106.1) "Mix 106" Waxhaw, NC	G1R, 17	7.92
WUSF-FM (89.7) Tampa-St. Petersburg, FL (Public Radio)	C4, 10	8.26

AUDIO SUBCARRIERS / SCPC SERVICES

FM SQUARED (FM²) AUDIO GUIDE

GE-3 Transponder 13 (C-band)

Ambassador Inspirational Radio	4.47 and 4.65 MHz
Blank audio carriers	1.05 and 3.57 MHz
Focus on the Family	1.23 and 1.41 MHz
Information Radio Network	3.39 MHz
International Broadcasting Network (IBN)	4.83 MHz
USA Radio Network	4.30, 5.01 and 5.20 MHz
Various Religious Programs (no common ministry)	.33 and 3.75 MHz
VCY/America (channel 1)	.51 MHz
VCY/America (channel 2)	.78 MHz

GE-3 Transponder 17 (C-band)

Blank audio carriers	1.28 and 3.57 MHz
Data Transmission	.80, 1.14, 1.21, and 2.06 MHz
Focus on the Family	1.05 and 1.40 MHz
In-Touch Ministries	4.47 MHz
Salem Satellite Network	4.65, 4.84, 5.01, and 5.20 MHz
SRN News	.33 MHz
USA Radio Network	1.77 MHz

Galaxy 3R Transponder 3 (Ku-band)

Blank Audio Carriers	2.06, and 3.25 MHz
Data transmissions	.06, .62, 2.93, 3.07 and 3.17 MHz
AP Network News	3.53 MHz
In-Store audio network ads (various companies)	.71, .81, .91, .98, 1.05, 1.15, 1.26, 3.44, 3.62, 3.70, 3.80, 3.88, 3.97 and 4.20 MHz
Muzak Services	.15, .27, .39, .51, 1.36, 1.48, 1.60, 1.72, 1.84, 1.96, 2.19, 2.31, 2.44, 2.56, 2.68, 2.80, 3.34, 4.08, 4.34, and 4.45 MHz

Galaxy 3R Transponder 16 (Ku-band)

Data transmissions	.64, 1.95, 2.18, 2.40, 2.52, 2.73, 2.82, 2.92, 3.20, 3.24, 3.47, 3.73, 3.97, 4.14, and 4.24 MHz
In-Store audio networks	.15, .27, .39, .99, 1.11, 1.23, 1.47, 1.59, 1.71, and 1.83 MHz

Telstar 5 Transponder 28 (Ku-band)

Data Transmissions	.06, .15, .23, .30, .35, .38 .47, .57, .65, .71, .74, .76, .84, .89, .93, .96, 1.05, 1.12, and 1.22 MHz

Single Channel Per Carrier (SCPC) Services

By Robert Smathers
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An SCPC transmitted signal is transmitted with its own carrier, thus eliminating the need for a video carrier to be present. Dozens of SCPC signals can be transmitted on a single transponder. In addition to a standard TVRO satellite system, an additional receiver is required to receive SCPC signals.

The frequency in the first column is the 1st IF (typical LNB frequency) and the second column frequency (in parentheses) is the 2nd IF (commercial receiver readout) for the SCPC listing. Both frequencies are in MHz.

GE-2 Transponder-Vertical 13 (C-band)

1178.70 (81.3)	NASA space shuttle audio

GE-3 Transponder-Horizontal 13 (C-band)

1207.90 (52.1)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1204.25 (55.75)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1204.00 (56.0)	SRN (Salem Radio Network) News
1201.50 (58.5)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1201.30 (58.7)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1189.20 (70.8)	Praise Broadcasting Network–religious
1188.80 (71.2)	Occasional audio
1188.50 (71.5)	Praise Broadcasting Network–religious

Galaxy 6 Transponder 1-Horizontal (C-band)

1443.80 (56.2)	Voice of Free China (International Shortwave Broacaster) Taipei, Taiwan
1443.60 (56.4)	KBLA-AM (1580) Santa Monica, CA–*Radio Korea*
1443.40 (56.6)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1438.30 (61.7)	WWRV-AM (1330) New York, NY–Spanish religious programming and music, ID–*Radio Vision Christiana de Internacional*
1436.50 (63.5)	West Virginia Metro News–network news feeds

Galaxy 6 Transponder 3-Horizontal (C-band)

1404.80 (55.2)	KOA-AM (850)/KTLK-AM (760) Denver, Colo–news and talk radio/Rockies MLB radio network
1404.60 (55.4)	WGN-AM (720) Chicago, IL–news and talk radio/Cubs MLB radio network
1404.40 (55.6)	Illinois News Network/WMVP-AM

SINGLE CHANNEL PER CARRIER (SCPC) SERVICES

	(1000) Chicago, IL–"ESPN Radio 1000"/Chicago Blackhawks NHL radio network/Chicago Bulls NBA radio network/White Sox MLB radio network
1404.20 (55.8)	Tribune Radio Networks/Wisconsin Radio Network
1402.90 (57.1)	USA Radio Network
1402.70 (57.3)	WLAC-AM (1510) Nashville, TN–news and talk/*Road Gang* trucker program (overnight)
1402.20 (57.8)	NorthWest Ag News Network - Agriculture info for the Pacific Northwest
1402.00 (58.0)	Occasional audio
1401.50 (58.5)	Agrinet Ag info/USA Radio Network
1399.60 (60.4)	Occasional audio
1399.20 (60.8)	Occasional audio
1399.00 (61.0)	Sports Byline USA/Sports Byline Weekend
1398.80 (61.2)	Talk Radio Network (TRN) – talk radio format
1398.50 (61.5)	Occasional audio/Denver Nuggets NBA radio network
1398.30 (61.7)	WSB-AM (750) Atlanta, GA– news/talk/Atlanta Hawks NBA radio network/Atlanta Braves MLB radio network
1398.00 (62.0)	Occasional audio
1397.80 (62.2)	Occasional audio/Colorado Avalanche NHL radio network
1397.50 (62.5)	Minnesota Talking Book Radio Network–reading service for the blind
1397.10 (62.9)	Wisconsin Radio Network/Wisconsin college sports
1396.90 (63.1)	KRLD-AM (1080) Dallas-Ft. Worth, TX – news and talk radio format/Texas Rangers MLB radio network
1396.70 (63.3)	Radio America Network/Business News Network
1396.40 (63.4)	Georgia News Network (GNN)–network news feeds
1396.00 (64.0)	WHO-AM (1040) Des Moines, IA–talk radio/Iowa News Network
1395.80 (64.2)	WTMJ-AM (620) Milwaukee, WI–talk radio/Milwaukee Bucks NBA radio network/Brewers MLB radio network
1395.60 (64.4)	WGST-AM/FM (640/105.7) Atlanta, GA ID *Planet Radio*–news and talk radio
1395.40 (64.6)	Michigan News Network–network news feeds/Detroit Redwings NHL radio network
1395.00 (65.0)	Occasional audio
1394.70 (65.3)	WJR-AM (760) Detroit, MI–news and talk radio/Michigan News Network/Tigers MLB radio network
1394.30 (65.7)	Michigan News Network – network news feeds
1385.40 (74.6)	WDUQ-FM (90.5) Pittsburgh, PA – Jazz format
1384.60 (75.4)	WDUQ-FM (90.5) Pittsburgh, PA – Jazz format
1384.40 (75.6)	KOA-AM (850)/KTLK-AM (760) Denver, CO–news and talk radio sports/Rockies MLB radio network
1384.20 (75.8)	WSB-AM (750) Atlanta, GA – news/talk/Atlanta Hawks NBA radio network/Braves MLB radio network
1383.70 (76.3)	Motor Racing Network (occasional audio) NASCAR racing
1383.10 (76.9)	KIRO-AM (710) Seattle, WA–news and talk radio/Mariners MLB radio network
1382.60 (77.4)	Soldiers Radio Satellite (SRS) network–U.S. Army information and entertainment radio/Army college sports
1382.00 (78.0)	Occasional audio
1381.60 (78.4)	KEX-AM (1190) Portland, OR–news and talk radio/Portland Trailblazers NBA radio network
1381.40 (78.6)	Occasional audio
1381.20 (78.8)	KJR-AM (950) Seattle, WA– sports talk radio/Seattle Supersonics NBA radio network
1377.10 (82.9)	In-Touch–reading service
1376.00 (84.0)	Kansas Audio Reader Network–reading service
1375.40 (84.6)	USA Radio Network/Agrinet Agriculture news service
1370.10 (89.9)	WRVG-FM (89.9), Lexington, KY – blues music format

Galaxy 6 Transponder 4-Vertical (C-band)

1376.00 (64.0)	Data Transmissions

Galaxy 6 Transponder 6-Vertical (C-band)

1347.00 (53.0)	WCRP-FM (88.1) Guayama, PR–Spanish language religious programming

Anik E2 Transponder 1-Horizontal (C-band)

1446.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (Quebec) service

Anik E2 Transponder 7-Horizontal (C-band)

1326.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (Eastern Arctic) service

Anik E2 Transponder 13-Horizontal (C-band)

1206.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (MacKenzie) service
1205.00 (54.5)	Canadian Broadcasting Corporation (CBS) Radio–Occasional feeds/events

Anik E2 Transponder 17-Horizontal (C-band)

1126.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (Western Arctic) service
1125.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio–North (Newfoundland and Labrador) service

Anik E2 Transponder 23-Horizontal (C-band)

1006.00 (54.0)	Societe Radio-Canada (SRC) Radio–AM Network
1005.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio-North (Yukon) service

Solidaridad 1 Transponder 1-Vertical (C-band)

1447.90 (52.1)	Antenna Radio Noticias
1447.60 (52.4)	Antenna Radio Noticias
1447.20 (52.8)	La Grande Cadena Raza
1447.00 (53.0)	XEMZA-AM 560, Manzanillo, Mexico

Anik E1 Transponder 21-Horizontal (C-band)

1036.70 (63.3)	In-store music
1037.00 (63.0)	In-store music
1037.50 (62.5)	In-store music

SBS5 Transponder 2-Horizontal (Ku-band)

1013.60 (80.4)	Wal-Mart in-store network
1013.20 (80.8)	Wal-Mart in-store network
1012.80 (81.2)	Sam's Wholesale Club in-store network
1004.50 (89.5)	Wal-Mart in-store network
1004.00 (90.0)	Wal-Mart in-store network
1003.60 (90.4)	Sam's Wholesale Club In-store network
1003.20 (90.8)	Wal-Mart in-store network

RCA C5 Transponder 3-Vertical (C-band)

1404.60 (55.4)	Wyoming News Network–network news feeds
1400.60 (59.4)	Learfield Communications
1400.40 (59.6)	Learfield Communications/MissouriNet
1400.20 (59.8)	Occasional audio
1400.00 (60.0)	Learfield Communications
1396.60 (63.4)	Kansas Information Network/Kansas Agnet–network news feeds
1396.40 (63.6)	Liberty Works Radio Network – talk radio
1396.20 (63.8)	MissouriNet/St Louis Cardinals MLB radio network
1396.10 (63.9)	MissouriNet
1395.90 (64.1)	Western Montana Radio Network/Red River Farm Network
1395.70 (64.3)	MissouriNet/Kansas City Royals MLB radio network
1386.40 (73.6)	Learfield Communications
1386.20 (73.8)	Radio Iowa/Iowa college sports
1386.00 (74.0)	United broadcasting Network–talk radio
1384.60 (75.4)	Capitol Radio Network
1384.00 (76.0)	Occasional audio/ABC Direction Network–network news feeds
1383.80 (76.2)	Occasional audio
1383.40 (76.6)	Capitol Radio Network
1382.90 (77.1)	MissouriNet
1382.50 (77.5)	Virginia News Network–network news feeds/Washington Wizards NBA radio network
1382.10 (77.9)	Learfield Communications/MissouriNet/Blues NHL radio network

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Satellite Launch Update

This month I'm going to cover some much neglected territory, namely, a look at up coming satellite launches: what satellites will be where and how this may effect your viewing. I'm also going to dip into the Launching Pad mail bag and share a few of the most recent letters from readers.

Life and Death in the Clarke Belt

It was only three years ago that the broadcast satellite industry was doing what it does best: wringing its hands. It seems there's always something to fret over and this time it was a shortage of transponder space. A year ago the most obvious sign that the problem no longer existed was the appearance of "This Space for Rent" billboards on several satellites in the Clarke Belt. There may be a few more of those signs soon, thanks to the active launch schedule of the past six months and that of the next half year.

Older domestic broadcast satellites typically had a design life span of 10 years. Current design life spans are for 13 or 14 years. Barring unforseen complications from on-board anomalies or errant meteors, satellites launched today may serve in an undiminished capacity for up to 15 years. The actual amount will vary depending on how much fuel it takes to fly these birds.

In order to keep a satellite perched at its assigned orbital slot in the Clarke Belt, the orbit must be continually touched up by ground controllers. Fuel used to steer the satellite is on-board and, when the gauge reads "empty," controllers will have already switched the transponder activity to the replacement satellite and the old bird is sent to a higher orbit away from the Clarke Belt.

Incidently, it's possible to extend a satellite's useful capacity even longer by flying the bird in a "figure 8" pattern in its orbital slot. Letting it drift a little more than normal uses much less fuel, thereby extending its life. This is called an "inclined orbit" which is referred to as the "Comsat Maneuver."

If you want to watch a couple of really old satellites chugging along in the Clarke Belt, take a look at Satcom K2 at 81 degrees West which was launched in January 1986 and remains there courtesy the Comsat Maneuver. Spacenet 3R, launched in March of 1988

Aging satellite Spacenet 3 is host to satellite TV's newest coming attraction: C3D. Billing itself as "3D Stereoscopic Television" it hopes to lure viewers with its 3D movies which are viewed through their own 3D glasses.

still hosts a number of services including Home Team Sports (one of the oldest sports networks on satellite) and C3D (one of satellite's newest). SBS 5 was launched in September of 1988 and is home to WNMB, the Russian-American channel, among others.

One other thing to know about today's satellites is that they pack considerably more power output than the older birds. Fifteen years ago a new satellite would have about 4 watts output, which was the main reason for needing a 10-foot diameter dish. By the late '80s 8 watts was typical, and by the early '90s birds put out an astonishing 16 watts.

The latest satellites, such as the soon to be launched Galaxy 11, feature 20 watt C-band and 75 watt Ku-band transponders. That's five times the power of 15 years ago. Newer international satellites such as Panamsat 5 (58 degrees W.) have 50 watt C-band transponders. No wonder you can pick up those digital video broadcast (DVB) signals on a 4.5-ft dish!

New Birds on the Block

The last six months has seen the launch of Satmex 5 (a C/Ku-band replacement for the aged Morelos 2) at 116.8 degrees West; GE 5 (a Ku-band only satellite at 79 degrees W.); and Telstar 6 (a C/Ku-band combo at 93 degrees W.). That's a good bit of capacity, but nothing compared to what else is coming up this year.

By the time you read this, Galaxy 11 should be in orbit and testing. This 24 C and 24 Ku-band transponder satellite will initially replace the fading Galaxy 6 at 99 degrees W. Next month will see the launch of Telstar 7, a satellite sporting 24 C and 32 Ku-band transponders, which will wedge itself between Galaxy 5 and Satcom C3 at 129 degrees W. This is what's known as the "cable neighborhood" for the close proximity of satellites carrying cable-TV fare almost exclusively.

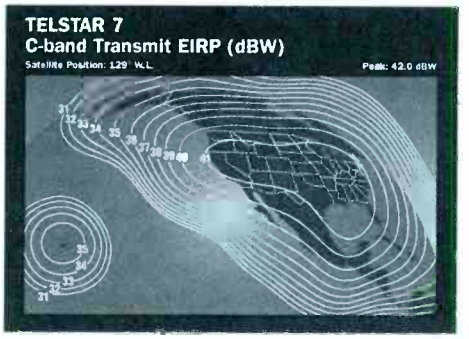
September will see the launch of GE4 which will replace Spacenet 4 at 101 degrees W. GE4 will have 24 C and 28 Ku-band transponders. A month later Galaxy 10R will be launched. The "R" signifies that the satellite will replace one by that same name which was destroyed on launch. G10R will replace both Galaxy 9 and SBS5 at 123 degrees W. G9 will move to 127 degrees W. between G5 and the new Telstar 7.

Galaxy 4R is scheduled to be launched in October of this year and replace Galaxy 11 at 99 degrees W. G11 will move to parts yet to be disclosed. And, finally, Galaxy 3C will take its 12 C and 48 Ku-band transponders to replace the current G3R at 95 degrees W. Got all that?

My rough estimate indicates that by the end of 1999 we'll see a net increase of some 84 C-band and over 150 Ku-band transponders. When you consider that many new services launching this year will use some form of digital compression (DVB or DCII, digicipher II) that means there will be a net increase in capacity of *several hundred* channel spaces. There ought to be a fire sale on transponder rates!

It should also indicate that if you bought a complete C-band satellite system today, you would still be watching it 15 years from now.

Excess C-band capacity may see more billboards like this one from over a year ago.



Footprint Charts: Galaxy XI, Telstar 6 and Telstar 7

The incredibly low prices currently available on C-band equipment, both new and used, represents one of the best satellite viewing opportunities in decades.

Mail Bag

• *MT* reader Judy May writes that she has been transferred to a new location and as she and her husband search for a new home they've come across the specter of Home Owner's Association restrictions on antennas in general and satellite antennas in particular. She reports that many real estate agents seem unprepared to deal with the issue. She says, "...I am glad we had the forethought to address this subject before we buy, rather than after it's too late. It is very saddening that the majority of the population looks upon such a fine hobby as being 'an eyesore'."

She has run across yet another home owner's nightmare. After researching three home owner's insurance policies, she decided to read the fine print and found out that one did not cover "...satellite dishes nor any equipment connected to them." Horrified, I called my local insurance agent who said that it was very unusual and certainly not common practice to write such a disclaimer in a policy. Needless to say, Judy will be signing with one of the other two policies!

What has your experience been with your home owner's insurance related to satellite or radio equipment? Let me know.

• Tin Luu of Garden Grove, California, would like to receive programming from his homeland, Vietnam, and is a fan of Asian Football (soccer). He asks, "...What equipment do I need to be able to receive satellite signals from Asia?"

I looked in Baylin's *World Satellite Yearly* to see if any of the Asian satellite footprints covered any part of California. It seems the best bet would be Intelsat 702 (177 degrees E.) and Intelsat 802 (174 degrees E.) since both have spot beams aimed at the U.S. west coast. Reception will require at least a 10-ft dish, possibly bigger; the lowest noise temperature LNB you can afford; an analog and digital (DVB) receiver.

On U.S. satellites there is only programming from China, Japan, Thailand, Korea, Taiwan, Hong Kong and the Philippines. I hear from a lot of soccer fans and I always recommend Fox Sports World (GE3 87 degrees W.), which has an abundant supply of international soccer and is available by subscription. You'll need a standard C-band satellite system with a VideoCipherII decoder module. If you have access to cable-TV you might inquire if your local cable provider carries Fox Sports World.

• Henry Yamauchi writes via email, "...in your (February) column you mention SCPC (single channel per carrier) receivers.... the Uniden SQ/590 already comes with SCPC built in. Is it still worth buying a separate dedicated SCPC receiver?"

As far as I know, the Uniden SQ/590 is no longer in production, but may be available used from dealers or individuals or at ham fests. I have not actually played with the SQ/590, but, I've heard from those who have that they were not as sensitive as stand-alone SCPC receivers. I'd like to hear from any readers who have used the SQ/590.

• Rich Piehl writes that he has been "...a radio hobbyist for 30 years, and a satellite nut for 5+ years. I enjoyed your "Radio on Satellite" article. There is one quibble I have with one of your facts, however. You give the westernmost satellite for this hemisphere as F1. That leaves poor old F5 out there as a forgotten orphan..."

It's true Rich, F5, which has no video for the lower 48 and only a handful of analog SCPC radio signals, gets little attention especially from us Easterners whose view of this "lowly" bird is usually obstructed by anything taller than a step ladder. Rich also notes that he plans to route the LNB signal from his 6 foot dish (using a DC voltage blocking "f" connector) to the Winradio 1500e in his computer to tune SCPC signals. Sounds like a great idea, Rich; let us all know how it works!

• I often get letters and email from people who complain that they can't find good used satellite equipment in their area. This is a problem for a lot of folks who don't live near heavily dish-populated areas. *MT* reader Bill Perrelli writes that he might be able to help. Having moved to a new location he is unable to install his satellite system and is forced to sell it. His system includes many top grade components.

This seems like an excellent opportunity for *MT* readers who want a real deal on some excellent gear to get a start in satellite TV. While I can't vouch for the equipment, I can give you his email address and maybe you can all help each other out. Drop me a line and I'll put you in touch with him.

Skip Arey, N2EI
tjarey@home.com

Setting Up a Monitoring Post

Most beginners spend their first monitoring season or two setting up their monitoring post anywhere they can. Many people just sort of wander around the house with their portables. If you have your scanner running in the family room, no doubt some members of your family have commented that you should consider moving its location so it does not interfere with their enjoyment of the latest episode of whatever sit-com is hot on TV this week.

You have probably discovered by now that successful listening also involves a certain amount of research and record keeping that is a bit hard to do when your receiver has no permanent home. Much has been written over the years about the kind of desk and chair that makes for good listening. Instead we are going to take a look at the room itself.

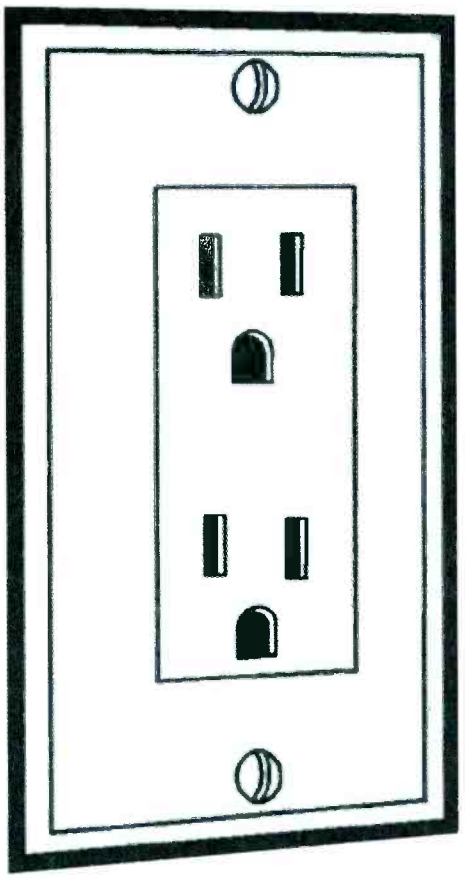
What is Your Location Situation?

Real estate speculators always say that location is the most valuable thing about a property. However, not all places are ideal locations for enjoying the radio hobby. I also think it is safe to assume that very few folks are willing to pull up stakes and move just for the further enjoyment of monitoring. (If you can afford to do that, drop me a line about my "reasonable" personal consultation fees). Further, if you live with other people who are not equally dedicated to radio monitoring, you will find certain limits as to where in your location you may locate your equipment. Seeking out your initial shack space requires that you find the best place in the house that gives you privacy, power and access to the outside of the house.

The Radio Hobby Privacy Act of 1999

Now that is a law that I wish the government *would* pass. Dedicated radio people sometimes drag themselves out of bed in the wee small hours of the morning to hear something that is not there any other time of the day or night. Likewise, listening during "normal" hours can be frustrating if other members of your clan disturb you, just as that ID of Radio Freedonia you have been seeking for six months comes over the air. What you want is two-way privacy.

Every house I have ever been in seems to



have a corner where things that are seldom used get piled up. Stuff that is always sort of out of sight and out of mind. This might be a good place to begin your hunt for a station location. If your children have yet to discover the joys of owning copious amounts of clothing, there may be a closet that can be turned into an ideal monitoring spot. Basements, if they are not too damp and dreary, are also popular places for a listening post.

A great out of the way place is a corner in a spare or guest room that is not in regular use. Besides, when friends visit you can introduce them to the greatest hobby in the world! Avoid attics and garages unless they are sufficiently climate controlled. If you want to wear two pairs of longjohns while enjoying a hobby take up ice fishing!

More Power

With apologies to Tim Allen, part of thinking out your shack location is going to be your direct access to sufficient power for your receivers and any other equipment you draw into the fray. Of course these needs will be different for each person. Minimally, you will need to have one grounded outlet to plug in the receiver. If you have more than a few accessories you will want to consider one of the many power strips that are available on the market. These are especially useful because they are usually fused and have a master power switch. Better quality power strips also provide protection against line voltage surges, further protecting your investment.

Be careful not to exceed the recommended capacity for either the power strip or the wall outlet. *If you have any questions concerning you household power and its use consult a licensed electrician!*

In my latest shack setup, I have had to take extra steps in the electrical area because I am beginning to experiment with solar and battery power. I need to make appropriate wire runs for solar panels and provide for safe placement of my batteries, including venting for the charging gases that can form in lead-acid cells. It's a bit more work, for certain, but in the end I'll have a station that will keep on running for a long while after the local power goes out.

If you are modifying an area to become a shack, you will want to get with your electrician to discuss installation of sufficient wall outlets to meet your anticipated hobby needs. You might want to discuss putting your shack's power on one or more separate circuit breakers to allow for additional power needs especially if you plan to enter the world of Amateur Radio. Transmitting requires significantly more power than receiving. Remember, long extension cords are not only tacky, you can trip over them and they can become fire hazards.

I See the Light

This is sort of a sub-subject of power because very few folks monitor by candlelight. You will want to have plenty of light to make reading and writing possible without eyestrain. Depending on which frequencies you frequent, try to stay away from fluorescent lighting. Fluorescents can cause un-

wanted interference. (Is there such a thing as *wanted* interference?)

Stick with incandescent lightbulbs for best performance. Try to locate the lighting so that it does not cast shadows when you are reading and writing. Ceiling lights are notorious for this.

Reaching Out to the Realworld

One of the first signs that someone has finally decided if they enjoy the radio hobby or not is when they plan to put up an outside antenna. Planning for first and future antenna installations should be part of your shack design project.

Easy access to the outside world for antenna lead-ins is not as tricky as it sounds. Usually the easiest route outside is through a window. A simple system for running cables in and out of your house can be had by installing a piece of 2x4 lumber under a window. Drill holes through the 2x4 to accommodate all the wires. You can also run your ground wire out to an outside ground stake through this 2x4 if you do not have a cold water pipe near your shack setup.

A more permanent solution to outside access can be had by removing one window pane and replacing it with Plexiglass. If you are more experienced in carpentry you can drill through windowsills and even walls. This usually requires extra long drill bits and a real clear understanding of what you are drilling through. Drilling through a water pipe can ruin your house. Drilling through house wiring can ruin your ***life***!

If you do choose to drill your way out of your house make sure that you insulate the wire's path through the wall against contact with any metal flashing, insulation or siding. This can be done with common PVC (Poly Vinyl Chloride) piping available at most hardware stores. A more elegant solution can be found at most electronics supply stores. This consists of a plastic tube with fittings on both ends that allow you to feed wires easily through any hole you have drilled.

When planning your outside access, make sure you actually go outside and take a gander at where the wires are going to be coming out. Check to see that the antenna lead-ins will not need to traverse the path of incoming household power or telephone lines. This is a basic safety precaution to assure that your monitoring never becomes a shocking experience.

The actual choice of antennas you may consider is beyond the scope of this article. However, you may want to peruse any of the popular antenna books available through the various radio booksellers found in the pages of *MT* as part of your shack planning process.

Space Utilization

Now that you have zoned in on your shack location you will want to give some thought to making the space most useful.

After you have picked out a desk and chair that suits your needs you will want to plan for maximum use of the remaining space for that research and record keeping stuff we talked about earlier. Old Uncle Skip's first law of great shack design is, *You Can Never Have Enough Shelves,* closely followed by my second law, *You Can Never Have Enough Filing Cabinets*. A couple of shelves right over your receivers will hold all of those important frequency reference materials. A two or four drawer file cabinet is just the ticket for storing articles, log sheets and other record keeping materials.

If you want to make things as efficient as possible there is a neat "Human Engineering" experiment you can preform before you even drive a single nail. Put a chair in the spot you plan to sit during your DX sessions. First look straight ahead. Assuming that your receivers are arrayed on your table top (tilted upward to avoid neck strain, of course), that point at eye level is the ideal place to install a shelf for your most needed reference materials.

Now, from the same sitting position move your dominant hand around the desk top and room space. Everything within the immediate reach of your hand can be controlled quickly. From your operating position you can now envision the most likely locations for desk, drawers, file cabinets, shelves and switches.

Shelving comes in all shapes and sizes and can be had for very reasonable prices. Shop around a few hardware stores and lumber yards till you find what is right for your location. The only proviso I would make is that you make sure the shelving is sturdy and firmly installed. Nothing can ruin a monitoring session quite like a load of books pouring down on your head.

As you can see, planning is essential to setting up a room for the radio monitoring hobby. Take your time. A little bit of extra thought at this stage of the game can help you create a monitoring post that will give good service for many years to come. Look at several configurations. If you know someone local who is involved in the radio hobby I am sure they will be pleased as punch to show off their shack to you. You can get many great ideas this way. And, of course, *Have Fun.*

VIEW FROM ABOVE

WATCHING THE WEATHER SATELLITES

Lawrence Harris
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http://www.itchycoo-park.freeserve.co.uk

So GOES the Weather

In this edition I am looking at the current weather satellite situation, the next GOES launch, how to start monitoring weather facsimile, and a quick glance at a new product.

There are currently seven polar orbiting weather (or similar) satellites transmitting images – though not all transmit continuously. Add to this the constellation of geostationary weather satellites covering almost all longitudes, and the result is that, using basic hardware, we have the means for monitoring the weather anywhere throughout the world!

The only polar orbiters transmitting continuous imagery are the three NOAAs – NOAA-12, NOAA-14 and NOAA-15. These three weather satellites provide us with reliable weather pictures day and night.

The Russian weather satellite Meteor 3-5 was recently joined by Resurs-01-4 that transmits better quality pictures, but uses the same frequency. Although this is by no means the first time that we have had two Meteor-type weather satellites using the same frequency, it is rare – and apparently unnecessary. Resurs has previously transmitted APT on 137.30 and 137.40 MHz, so settling on 137.85 MHz (and therefore clashing with Meteor 3-5) is curious.

Because the satellites have slightly different orbital characteristics, it was inevitable that their pass times would periodically coincide in various places around the globe. Meteor 3-5's orbit has a period of 109 minutes and slowly precesses with respect to the sun; Resurs is nominally sun-synchronous, with a period of 101 minutes. I logged my first instance of simultaneous transmissions on February 17 when Resurs rose above my horizon during the Meteor 3-5 pass at 1310 UTC, causing about one minute of interference.

During following days the problem rapidly worsened; for a few days my software produced half of one image merging into half of the other – with the associated synchronization difficulties.

Picture quality differs; Meteor 3-5 is an old satellite, and detailed examination of its imagery shows line faults. Resurs provides a much higher quality image, as expected of a new satellite. Close examination of the edge adjacent to the black-and-white bars (not shown here) reveals an image anomaly along the length of the frame.

As on March 8, here in Plymouth reception of the signal from Meteor 3-5 is being severely affected by some other transmission – unless the satellite itself has a problem.

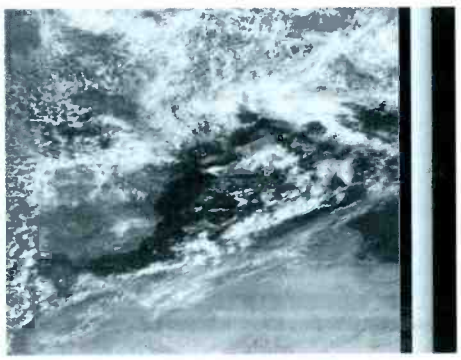

FIG 1: *Resurs 01-4 1032UTC March 6*

Figure 1 shows the southbound pass over Britain and western Europe on March 6. The lower section shows north Africa and southern Spain under clear skies. This image has been enhanced because, like Meteor images, Resurs images show good detail in clouds – but land remains dark.

The Okean-4 and Sich-1 oceanographic satellites make rare, short transmissions, usually over western Europe. If any reader monitors transmissions from either satellite while over continental USA I would be most interested to receive details (and preferably a copy of the image via e-mail). I logged several Okean transmissions during February, but none so far during March.

GOES launch scheduled for May

The latest in the series of GOES weather satellites, GOES-L, is now scheduled for launch on May 15. When in orbit it will be renamed GOES-11. After having being assembled and tested during 1997-98, GOES-L will be launched to on-orbit storage and will replace GOES-8 as GOES-EAST in 2000 AD.

The next GOES spacecraft (following GOES-L) is GOES-M, currently being assembled and tested. Launch is planned for October 2000, and this will avoid on-earth storage costs and additional post-storage testing. GOES-M is expected to replace GOES-11 in 2004.

If GOES-M had to be called out of on-earth storage to replace an on-orbit failure, there would be nine to 12 months of preparation between call-up and launch, followed by three months of post-launch deployment and testing before GOES-M could become operational.

It is normal practice for each GOES spacecraft to have a "letter" designation until it reaches successful orbit, when it is given a numerical designation. GOES-I became GOES-8, GOES-J became GOES-9, GOES-K became GOES-10. GOES-L will become GOES-11 when in orbit, and similarly GOES-M will become GOES-12; GOES-N will become GOES-13; GOES-O will become GOES-14.

The Platform

The advanced GOES I-M spacecraft series incorporate modifications designed to increase the operational lives of the satellites, based on the experience gained from previous spacecraft. GOES-L is a three-axis, body-stabilized design that enables the sensors to view the earth and image clouds more frequently.

The I-M series monitor the earth's surface temperature and water vapor, and sound the atmosphere. This should help to follow the evolution of atmospheric phenomena, ensuring real-time coverage of short-lived, dynamic events, especially severe local storms and tropical cyclones. These meteorological events directly affect public safety, protection of property, and, ultimately, economic health and development.

Some innovative features incorporated in the GOES I-M spacecraft enable high volume, high quality data to be generated for the weather community. My thanks to NOAA for providing comprehensive information about the GOES series.

For further, detailed information about the hardware and ground station operations

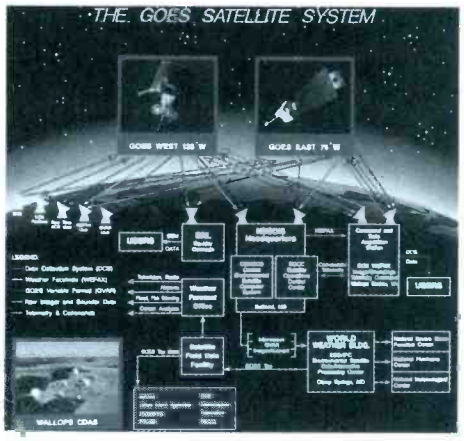

FIG 2: *GOES system – courtesy NOAA*

that form the GOES system, the NOAA web sites can be viewed:
http://psbsgi1.nesdis.noaa.gov:8080/EBB/ml/genlsatl.html
http://rsd.gsfc.nasa.gov/goes/text/goesnew.html

Correspondence

Some readers have e-mailed queries concerned with GOES weather satellite reception. It is worth finding out more about the GOES satellites, possibly using the Internet sites listed above. The field is wide open for receiving a variety of GOES transmissions, limited only by what equipment you can afford and accommodate!

Most of us set up a weather facsimile (WEFAX) receiving station because we can receive virtually continuous images from GOES-8 and GOES-10. You can purchase a WEFAX system from advertisers in *Monitoring Times*, or other options can also be considered.

To receive weather facsimile transmissions you require an antenna for 1691 MHz, a suitable receiver, a decoder and a computer. The antenna can be a dish or yagi. In Plymouth, UK, I can receive GOES signals using a 40-element yagi and preamp, and pointing the antenna just three degrees above my western horizon!

The receiver must be a weather satellite receiver for 1691 MHz, because this is optimally designed for extracting the unusual signal modulation. By "unusual," I refer to the unique method in which weather satellite image data is modulated on to the 2.4 kHz sub-carrier, requiring a relatively wide receiver IF (intermediate frequency).

Assuming a computer is available, the remaining essential item is some form of decoder to convert the extracted picture modulation into a recognizable image.

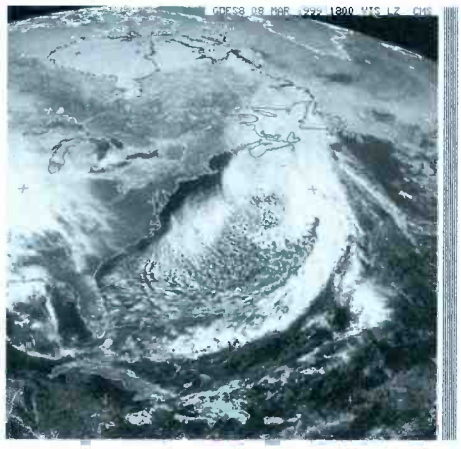

FIG 3: *A sample weather facsimile GOES-8 visible-light image March 8 at 1800 UTC*

DMSP images

Hank Brandli sent another unusual but fascinating image from the DMSP (Defense Meteorological Satellite Program), to which he has direct access. The picture shows the nighttime visual channel over the East Coast on February 19 at 0100 UTC, with the added bonus of the Aurora Borealis visible near the upper right of the image.

Aurorae are caused by the effects of enhanced solar activity interacting with the upper atmosphere. The approach to solar maximum means that we can expect to see more aurorae during the next couple of years.

FIG 4: *Aurora as imaged by DMSP satellite on February 19 at 0100 UTC from Hank Brandli. Image courtesy USAF.*

New products

One of the purposes of this column is to publish brief information about new products from weather satellite systems manufacturers, so I welcome news from all suppliers of such products. Timestep Weather Systems products are distributed by Spectrum International, Inc, and Swagur Enterprises. They are currently releasing some new products, with more planned for later this year. I had an early opportunity to test their new Windows LC external interface – a decoder for weather satellite data.

The unit (PROsat for Windows LC external interface and software) is a complete weather satellite decoder / serial interface in itself. It takes the audio signal from a weather satellite receiver, and outputs RS-232 serial data in exactly the same way as previous interfaces (such as the PROsat for Windows internal card).

This new interface goes a stage further than some decoding systems by allowing the software adjustment of individual satellite signal modulation. This overcomes the problem experienced when monitoring Meteor, NOAA and Okean-type weather satellites – each of which provides different levels.

If your current system is correctly set for NOAA weather satellite decoding, you may notice that Meteor images have the white levels bleached, with Okean images lacking contrast. Conversely, setting the levels to be optimized for Meteor images may leave NOAA images "flat" (that is, lacking contrast). The LC permits individual settings to be made for each weather satellite. The unit is priced at $199; further details can be obtained from Timestep's new web site:
http://www.time-step.com/

The American distributors are:

(1) Swagur Enterprises, Box 620035, Middleton, WI 53562, Phone/Fax (608) 592-7409. Email *swagur@execpc.com* Web Site **http://www.swagur.com**

(2) Spectrum International Inc. PO Box 1084, Concord, MA 01742. Tel. (978) 263-2145 Fax. (978) 263-7008.

FREQUENCIES

NOAA-14 transmits APT on 137.62 MHz
NOAA-12 and -15 transmit APT on 137.50 MHz
NOAAs transmit beacon data on 137.77 or 136.77 MHz
Meteor 3-5 and Resurs 01#4 transmit APT on 137.85 MHz when in sunlight
Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz
GOES-8 and GOES-10 use 1691 MHz for weather facsimile from 75 and 135 degrees longitude respectively.

Larry Van Horn, N5FPW
email: larry@grove-ent.com

The Hidden Military Aircraft Band

If you took a poll of radio enthusiasts and asked them what frequency ranges they should monitor to hear military aircraft communications on their scanner, 138-151 MHz might not be a range that would pull very high numbers. But the truth is, this frequency range is rich with air-to-air and air-to-ground military aircraft communications.

When I first got into Naval Aviation in the late 1970s, there was no VHF high band capability in any of the tactical aircraft with which I was familiar. In fact, most of the 225-400 MHz UHF radios we used still carried 0.1 MHz spacing capability. But that has all changed now. We see a definite increase in usage of the .025 MHz channels in the UHF milair spectrum and increased usage of the 138-151 MHz range for tactical and air-to-air communications.

Table 1 is a list of recently reported VHF air-to-air channels. All these communications will be in the AM mode (just like the civilian and military airband frequencies). The prime spacing found in this band is now .025 MHz just like the civilian and military airbands. Most of the communications that have been monitored on these frequencies appear to be used by U.S. Air Force units.

If you are looking for some U.S. Army air-to-air VHF frequencies, check out our list of 40 possible nationwide frequency assignments below.

138.025	139.425	139.625	139.650	139.725	139.975
141.125	141.275	141.425	141.675	141.775	142.375
142.975	143.300	143.375	148.025	148.250	148.475
148.500	148.650	148.675	148.700	148.725	148.750
148.775	148.825	148.850	149.625	149.650	149.700
149.725	149.750	149.775	149.800	149.825	149.850
150.450	150.650	150.750	150.775		

So the next time you're doing a search of the 138-144 and 148-150.775 MHz ranges, flip over to the AM mode and see what new adventures you can find in the *VHF Hidden Military Aircraft Band.*

TABLE 1: REPORTED VHF MILITARY AIR TO AIR FREQUENCIES

138.000 138.025 138.050 138.100 138.125 138.150 138.175
138.200 138.225 138.275 138.300 138.375 138.400 138.425
138.450 138.475 138.500 138.525 138.550 138.625 138.750
138.875 138.900 138.925 138.975 139.150 139.325 139.400
139.550 139.600 139.625 139.675 139.700 139.750 139.800
139.825 139.875 139.950 139.975 140.000 140.025 140.150
140.175 140.275 140.300 140.350 140.375 140.400 140.425
140.600 141.200 141.300 141.350 141.400 141.425 141.550
141.650 141.700 141.725 141.750 141.800 141.825 141.850
141.900 142.200 142.225 142.250 142.600 142.750 142.800
143.475 143.600 143.675 143.800 143.825 143.850 143.875
148.125 148.450 148.525 148.825 149.050 149.075 149.125
149.325 149.525 149.650 149.675 150.075

A UH-60L Black Hawk of the Fort Bragg, North Carolina-based Company B, 2nd Battalion, 82nd Aviation Regiment, takes off on a night mission. (U.S. Army Photo by Phillip Lee Britt)

What's on 138.925?

Several years ago, while I was visiting my hometown of San Antonio, I was driving around one of the local Air Force bases and noticed an occasional digital signal on 138.925 MHz. I also noticed that this digital signal would appear to transmit right before the base fire trucks rolled out on a call.

Adding up the evidence and checking with some friends in the know confirmed that this frequency is used as a nationwide primary frequency for digital fire alarm systems at selected U.S. Air Force bases. These systems are fairly low power and you probably won't hear them unless you're on the base and a fire alarm box has been activated.

So, if you see an allocation on this frequency for your favorite Air Force base and never hear anything, it might be a base fire alarm system you're trying to monitor.

Midwest Report

Regular *Milcom* reporter Paul Bunyan sent along the following to share with our Milcom readership.

The Iowa Air national Guard operations (Hawkeye Ops) for the 132 Fighter Wing in Des Moines has changed their VHF frequency from 138.900 to 138.150 MHz (AM).

The US Navy E-6A/B UHF AM operations have been noted on the following frequencies:

233.700	Offutt AFB, NE
310.150	NAS Patuxent River, MD
312.100	Tinker AFB, OK

Here are some air-to-air frequencies that Paul has monitored recently.

142.750	US Air Force SAM (Special Air Mission) 60403 working Nightwatch in the AM mode.
263.350	US Navy Blue Angels flight demonstration team (four ship formation)
272.100	Canadian Forces Snowbirds flight

The world famous Air Force Thunderbird flight demonstration team are heavy users of the 138-151 MHz "hidden military aircraft band."

	demonstration team (also air-to-ground)
333.550	US Air Force F-15s from Eglin AFB, FL (tentative)
384.550	US Air Force F-15s from Eglin AFB, FL (Callsign Demo ##)

Also according to Paul the F-16C/D model aircraft have radio gear installed that can operate on the following frequency ranges:

30.000-87.975 MHz	FM mode (25 kHz steps)	Transmit/ Receive
108.000-115.975 MHz	AM mode (25 kHz steps)	Receive only
116.000-151.975 MHz	AM mode (25 kHz steps)	Transmit/ Receive
225.000-399.975 MHz	AM mode (25 kHz steps)	Transmit/ Receive

That is an amazing total of 11,080 frequencies/channels/steps. Thanks, Paul; we always look forward to hearing from you.

Air Refueling, Part Deux

Right after the March issue of *Monitoring Times* hit the newsstands, I received a comprehensive list of Coronet air refueling frequencies from two anonymous sources. Thanks to you both for passing along these interesting UHF milair allocations.

Callsign	Designator	Primary	Secondary
11	Alpha	396.200	394.600
21	Bravo	391.000	388.400
31	Charlie	378.200	375.700
41	Delta	372.300	370.400
51	Echo	314.500	297.300
61	Kilo	343.100	322.800
71	India	254.600	255.750
81	Juliet	236.750	228.550
91	Foxtrot	293.000	289.700

And just so you shortwave folks don't feel left out in the cold, here are a few HF frequencies associated with air refueling missions (frequencies here are in kHz and mode is upper sideband).

6751	Nebraska Air National Guard (155ARW)
6761	U.S. Air Force Air Refueling Common (Worldwide)
9018	Refueling coordination frequency
9022	Nebraska Air National Guard (155ARW)
11217	Alabama Air National Guard (117ARW)/22 ARW McConnell AFB
11234.5	Alabama Air National Guard (117ARW)
11447	927ARW Selfridge ANGB, MI (Piston Ops)

Miscellaneous Stuff

One anonymous reporter here in the southeast U.S. passes along a new discrete frequency for the Bulldog MOA (Military Operating Area) south of Augusta, Georgia. He reports lots of nighttime activity in recent weeks by pilots using night vision equipment to guide A-10 aircraft out of Shaw AFB on Maverick missile attacks on farm houses, road junctions, and street lights, basically anything you can think of. The discrete frequency for the Bulldog MOA is 343.750 MHz.

Recently here in the Snowbird MOA we had a visit from the 116th Bomb Wing out of Robins AFB, Georgia. Seeing three B-1B bombers flying at low level across the Brasstown valley in front of Grove Enterprises was an exceptional sight. Even more fun was catching them on their UHF discretes as follows: 287.400, 293.525 (Peach Ops at Robins), 297.600, 314.300, and 359.100. Thanks to Bob Langley for the heads up.

A longtime Florida contributor and occasional visitor to Brasstown, Jack NeSmith, checks in with some interesting active frequencies down his way.

247.000	Ft. Stewart, Georgia (I show Wright AAF Tower-LVH)
267.500	FACSFAC Jacksonville, Florida "Sealord" (Primary-LVH)
270.600	FACSFAC Jacksonville, Florida "Bristol" (Ground Control Intercept-LVH)
272.500	NAS Jacksonville, Florida (Probably another Jax FAFCSFAC frequency-LVH)
273.700	NAS Cecil, Florida (Squadron common, various units-LVH)
285.700	NAS Cecil "Viper" (I think this is another Jax FACSFAC, Jack-LVH)
286.400	Avon Park Bombing Range, Florida (Range Control Target Scoring-LVH)
297.600	125 Fighter Wing, Jacksonville Intl Airport, Florida (NORAD discrete-LVH?)
300.800	125 Fighter Wing, Jacksonville Intl Airport, Florida (Dispatcher-LVH)
319.900	NAS Cecil, Florida (Jacksonville Approach/ Departure Control-LVH)
344.000	NORAD Tyndall AFB, Florida "Oakgrove" (probably using the Whitehouse remote-LVH)
380.800	Pinecastle Bombing Range, Florida (Range Operations-LVH)

Thanks, Jack, for sending us this list of active frequencies in the northern Florida area. And that about does it for this edition of Milcom. Remember, we want to hear from you. Send in your frequency reports to Milcom, P.O. Box 98, Brasstown, NC or you can e-mail them to: **larry@grove-ent.com**. See you in two months and good hunting.

Jean Baker, KIN9DD

Enhanced Traffic Management

Welcome aboard to the modern-day air traffic management system! The acquisition and sharing of information within the air traffic control system has been changing with advances in technology and in response to today's increased air traffic. The Houston Intercontinental Air Traffic Control Tower and Tracon gives a description of how the system works on their website, and they were happy to let us share it with you, so let's get started.

Air Traffic Control System Command Center

The Air Traffic Control System Command Center (ATCSCC) is an Air Traffic Operations Service facility consisting of four operational units:

1. Central Flow Control Function (CFCF) - Responsible for coordination and approval of all major intercenter flow control in order to obtain maximum utilization of airspace.

2. Central Altitude Reservation Function (CARF) - Responsible for coordinating, planning, and approving special user requirements.

3. Airport Reservation Office (ARO) - Responsible for approving Instrument Flight Rule (IFR) flights at high-density-traffic airports John F. Kennedy, La Guardia, O'Hare, and Washington National during specified hours.

4. ATC Contingency Command Post - A facility which enables the Federal Aviation Administration (FAA) to manage the ATC system when significant portions of it have been lost or are threatened.

Enhanced Traffic Management System

Did you ever wonder what happens to all the information and data that goes into and out of the air traffic control facilities across the country? The FAA's Enhanced Traffic Management System (ETMS) makes use of it all in the performance of air traffic management.

The central processing unit for this system is located in Cambridge, Massachusetts. The traffic management units (TMUs) at the air route traffic control centers (ARTCCs) and terminal radar control facilities (TRACONs), along with air traffic control system command centers (ATCSCCs), function as a team, making up the nationwide Enhanced Traffic Management System.

The Aircraft Situation Display (ASD) is a computer system that receives radar track data from all 20 ARTCCs located within the continental United States, organizes this data into a mosaic display, and presents it on a computer screen.

The display allows the traffic management coordinator (TMC) multiple methods of selection and highlighting of individual aircraft or groups of aircraft. The user has the option of superimposing these aircraft positions over any number of background displays. These background options include ARTCC boundaries, any stratum of en-route sector boundaries, fixes, airways, military and other special use airspace, airports, and geopolitical boundaries. By using the ASD, a traffic management coordinator can monitor any number of traffic situations, or the entire systemwide flow.

The ETMS relies on two types of data for operation: static and dynamic. Each data type has its individual characteristics, and each is used differently within the system. Additionally, the two types of data are provided by entirely different sources.

Static Data: The ETMS uses five types of static data: geographical, scheduled, aircraft dynamics, capacities, and General Aviation (GA) estimates. The static data is provided by various sources and contains information describing National Air Space (NAS) facilities, airspace structures, airport differences, and aircraft differences.

Geographical and aircraft dynamics data updates are sent to the ETMS field sites through the ETMS communications network. Capacities, schedule data, and GA estimates are updated by air traffic management specialists through the ASD.

Dynamic Data: Dynamic data is up-to-the-minute and includes NAS and weather data, Estimated Departure Clearance Time (EDCT) files, fuel advisory (FA) tables, and airline substitution requests from the air traffic control system that the ETMS processes use. Additionally, the ETMS generates airline substitution replies and control time messages.

Dynamic data differs from static data in that it is continuously updated; that is, the information is received at the Cambridge center in a continuous stream, literally hundreds of messages per minute, and the display of this information to the ASD is updated every three minutes.

The Airport Surveillance Radar

One of the most fascinating aspects of air traffic control is the radar system they use. The ASR-9 System is an undeniably complex surveillance radar that possesses seemingly amazing capabilities.

It is a medium range (60 nautical miles) airport surveillance radar that operates at S band (2.7 GHz) under crystal control, with a pulse width of 1.03 microseconds, a 1.3- to 1.6-degree azimuth beam width, an antenna rotation rate of 12.5 revolutions per minute, a typical pulse repetition frequency (PRF) of 1200 Hz, and an average power of 1188 to 1462 watts.

The ASR-9 in Houston is also equipped with the Mode Select (Mode S) Beacon System which is a combined secondary surveillance radar (beacon) and ground-air-ground data link system. That means it's capable of providing automated aircraft surveillance and communications to support Air Traffic Control when it's really busy.

What does this mean to you and me? Here's an over-simplified explanation: Computer equipment on the ground communicates with airborne computer equipment (located within the aircraft) and translates this data into the alpha-numerics and/or primary and/or secondary radar returns that the air traffic controllers see on the radar scope. This data is translated by the controllers, and the information gained is then used to determine the best and most efficient use of separation standards to get the job accomplished safely.

Other important features of this type of radar equipment include: a weather receiver, antenna, and redundant (back-up) channels, a surveillance and communications interface processor, waveguide systems, moving target detector system (formerly known as MTI), weather channels and remote monitoring subsystems.

As you can see, there are many variables to be considered in the application of radar procedures. The bottom line is that the United States still maintains the most efficient means of keeping airplanes safely separated.

Our thanks to Houston Intercontinental Air Traffic Control Tower and Tracon (**http://www.neosoft.com/~iah-atct/**) for the foregoing information.

See you in June with more aero news and views.

A KEYNOTE SPEAKER *from Grove!*

Grove's improved **SP-200B Sound Enhancer** is really six products in one. Just look at its many features and capabilities:

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Doug Smith, W9WI
w9wi@bellsouth.net

Domestic DXers Abroad

In February, I wrote about DXing on the road while traveling within one's own country. This month, I have some loggings from three American DXers who are *really* DXing on the road. These should give you some feel for what the DX hobby is like in other countries.

Michael Muehlbauer, N6TWX, wrote from Aachen in western Germany, near the border with Belgium and Holland. Using a Grundig YB400, his regular AM reception includes 47 stations in 17 countries. Some more distant stations include Radio Telefis Eirean (RTE) from Ireland, several Radio Nacional de España (RNE) stations from Spain, a Portuguese station on 594 kHz, Luxembourg on 1440, Russia on 1386 and 1494, and the Vatican on 1530 and 1611. Michael writes, "During Friday and Saturday nights, you should hear all the soccer games. It is really fun to hear the enthusiasm in Spain, Italy, and France of the announcers!"

Note the strange frequencies. Of course, there are no stations on 594, 1386, 1494, or 1611 kHz in North America; almost all stations here operate on exact multiples of 10 kHz. This is the case throughout the Western Hemisphere.

In Europe, Africa, and Asia, 9 kHz channels are used. They start at 540 kHz (actually there are now a few stations on 531) and go up from there—549, 558, 567, 576, etc. When conditions to Europe are good, sometimes these "off-channel" European signals will mix with American signals on the nearby 10 kHz channels and generate "hets" (heterodynes), continuous high-pitched tones. For example, the 2,000,000 watt Saudi station on 1521 kHz will often mix with WWKB-1520 Buffalo to yield a 1 kHz tone. Once in late 1997, I heard this "het" on my car radio near Springfield, Tennessee. If you hear something like this, it's a good time to put on the headphones and listen closely; you may be rewarded with some extreme DX!

There is also a longwave broadcast band in Europe, 150-300 kHz. Michael regularly hears 10 longwave stations from Germany, France, Russia, England, Luxembourg, Denmark, and Ireland. Because there is less interference in this band, these stations

RNE Radio 5 is an all-news station in Spain. Its transmitters on 558, 576, and 657 kHz are heard with excellent signals at Michael Muehlbauer's location in western Germany.

are easier to hear in North America. The loudest of the bunch is probably the Irish station "Atlantic 252" on 252 kHz. This is a pop music station, and really sounds a lot like a top-40 FM station in the States.

Oaxaca in southern Mexico is a little closer to home. Stephen Tulley writes from there with a list of US stations heard on a GE SupeRadio and dipole antenna. His log includes KWKH-1130 Shreveport, Louisiana, KOA Denver ("very faint"), and five stations in Texas. Stephen's best catch is KWED-1580 Seguin, Texas, which uses only 252 watts of power. Four of his loggings use directional antennas at night, all of which favor the south.

Stations you never hear in the inland US may be very strong overseas! Many of them beam their power across the city they're trying to cover, and then right out to sea at the nearest beach . . .

Long-time contributor John Ebeling of Minneapolis makes an annual trip to Barbados. He uses a Sangean ATS-818 on the island's south coast. Absolutely *nothing* was heard on the expanded band down there. The only mainland US stations John could identify were KYW-1060, WSB-750, and WFAN-660. He also received English-language WOSO-1030 from San Juan, Puerto Rico. There is currently a station operating on 790 on Barbados, but it's being simulcast on a new FM transmitter on 92.9, and the 790 frequency is to be phased out.

The Caribbean is also home to several stations on 5 kHz splits — frequencies midway between the regular AM frequencies used by most stations. Grenada has a station on 535 kHz; ZIZ on St. Kitts is on 555 kHz; and there is a station on 705 in St. Vincent. John asks, "Wonder how these are tuned with digital car radios?" I have no idea!

Expanded Band News

The "mystery station" on 1650 kHz has finally begun regular programming. As most DXers assumed, it was WHKT Portsmouth, Virginia, and it's relaying WPMH-1010. Also new to the expanded band are KSMH-1620 Sacramento, California (Catholic religion), and WTTM-1680 Princeton, NJ (which relays WHWH-1350 with business news).

KKWY-1630 Cheyenne, Wyoming, has been reported with an improved signal; this rare state may now be DXable in more locations. Finally, unlicensed "W-807" has been widely heard on 1710 kHz. This station airs rock music, and is believed to be in the Peoria, Illinois area.

Bits and Pieces

Stephen has DXed on the road in the US, too, and has a very interesting logging. A few years ago, he heard KFI-640 Los Angeles on 1280 kHz. 1280 is exactly twice KFI's frequency—its "second harmonic." I would normally expect to hear this harmonic (especially of a powerful 50,000 watt station like KFI) on a car radio near the KFI transmitter. But Stephen was on Interstate 80 in Wyoming at the time!

It is not unusual for AM stations' harmonics to be audible over considerable distances. If you have a shortwave receiver, tune the spectrum between 2000 and 3500 kHz, and you're likely to hear at least one broadcast station on a multiple of its real frequency. However, the only reason you're hearing these low-powered signals is that there is very little interference in this band. Stephen's logging is particularly unusual in that it wasn't buried under interference from other stations on 1280 kHz.

What's coming in this spring? Write me at Box 98, Brasstown NC 28902-0098, or by email to *w9wi@bellsouth.net*.

Good DX!

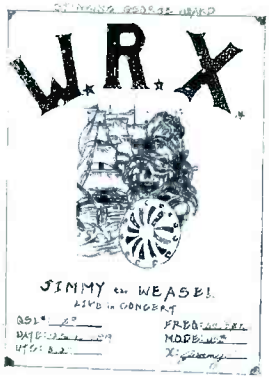
OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
George.Zeller@acclink.com

Jimmy the Weasel Busted by FCC

Multiple sources in the pirate radio community confirm that **WRX,** operated by pirate gadfly Jimmy the Weasel, was closed down by the FCC in mid-February. Jimmy's unusual programming generated mixed reviews from listeners, but it certainly was distinctive. When not yelling "Y2K" or "Your Stinkin' Mama" into his microphone, Jimmy produced "concerts" consisting of profane *a capella* singing. Some veteran pirate DXers noted some similarity between Jimmy's shows and another ill-fated pirate of the 1990s, Ira of **WPIG.**



As of the deadline for this month's column, the FCC had not yet released formal comments on this enforcement action. However, they have continued to close down a steady stream of unlicensed FM pirates, including **Canyon Lake Radio** on 105.7 MHz in Canyon Lake, TX, **Vibes 89.1 FM** in Oakland Park, Florida, and **WFLR** on 89.7 MHz in Howell, MI.

Jimmy's broadcasts were frequent on consecutive weekends for at least two months. Occasionally he announced telephone numbers and a Maine transmitter location over the air. Predictable and frequent operating patterns, used by **WRX** and most FM pirates, obviously make it easy for the FCC to execute enforcement actions. Thus, most pirates that you see here this month operate with erratic and random schedules, so as to minimize the odds of a bust.

Radio World Endorses Low Power FM

Radio World, a leading trade publication in the radio broadcasting industry, has endorsed the concept of licensed low power FM stations in the United States. Various proposals that would authorize this new broadcasting service are currently pending before the FCC. The magazine editorialized in its March 3 issue that, "The FCC should simply be a traffic cop ... And a traffic cop is not supposed to prevent new traffic from coming onto the road."

Some broadcasting industry representatives have been throwing cold water on the proposals, citing potential for interference to existing licensed broadcasting and potential economic damage to the current broadcasters from new low powered stations.

Many in the pirate radio community have criticized opponents of the plans such as the National Association of Broadcasters, suggesting that licensed stations oppose competition so as to retain their current monopoly on over-the-air radio programming. The FCC has not yet taken action on the proposals.

W807

Regular contributor Harold Frodge says that he regularly hears **W807** on 1710 kHz, apparently from Glassford, IL. Pop and rock music are normally featured. Is anybody else hearing this operation, which has moved above the new North American mediumwave AM expanded band?

Europirates Still There

We received numerous loggings of Europirate broadcasters this month, including stations such as **SWRS** on 3905, 7590, and 11470 kHz, as well as a host of less well heard broadcasters within 40 kHz of 6260 kHz. If you live in eastern North America, the period around your local sunset and European sunrise are the best times to chase European pirates.

Shortwave Pirate Activity

North American pirate radio stations heard by our readers last month all used frequencies within 500 kHz of 6955 kHz, typically from two or three hours before sunset until at least 0500 UTC. Morning and afternoon broadcasts increase on the weekends. Programming formats and contact maildrops (when known) are listed.

Blind Faith Radio- Psychedelic rock oldies dominate Dr. Napalm's shows. (Merlin)
CHU- This one isn't a time signal; it's a rock music pirate. (None)
Indira Calling- Sanjay with a parody of shortwave station All India Radio. (Providence)
Jerry Rigged Radio- Rock and discussion with Simon Bar Sinister. (Providence)
K-Mart Radio- Rock music, not "Attention Shoppers," is heard here. (None, uses *Stonecold6955@hotmail.com*)
Radio Atlantica- We're looking for more information on Dr. Fish Head's rocker. (None)
Radio Azteca- Bram Stoker's long-running parody station skewers DXers and DXing. (Belfast)
Radio Bingo- The result is always the same on this pirate radio bingo game. (Uses e-mail at *radiobingo@chek.com*)
Radio Chad- Rock and country music are mixed here. (None, try the Free Radio Grapevine)
Ricochet Radio- Rock, the radio hobby, and dogs are discussed here. (Pittsburgh)
Scorch- An active new punk rocker; their announcer's voice has an echo effect. (None, asks for reports on the Free Radio Grapevine at http://www.frn.net/)
Scream of the Butterfly- Johnny Rockin' says he has recovered from a severe bout of the flu, so he's back on the air. (Providence)
The Radio- Little is known about this new rock music station. (None)
Voice of Prozac- Rock with male and female announcers is their format. (Pittsburgh)
WACK- Their professionally produced rock shows include instant listener feedback from an 800 toll free number. (None, try *wackradiomail@juno.com*)
WKND- Radio Animal's rock and canine advocacy uses mad laughter as an interval signal. (Blue Ridge Summit)
WMPR- Their dance party music is still mysterious, as they do not contact listeners. Ranier heard them in Germany! (None)
WPN- They are back, this time with ancient oldies from the 1930's. (Huntsville)
WPOE- A new one with rock music and sketches; traditional pirate fare. (Huntsville)
WRX- We'll now have to worry about Y2K without Jimmy's reminders. (Manomet)
WRYT- Here's another rock music station; obviously this is common on the pirate band. (Belfast)
WWRX- Jimmy the Weasel's parody station survived longer than the real thing. (None, uses *wwrx@hotmail.com*)

Reception reports to pirate stations require 3 first class stamps for USA maildrops or $2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711, PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 25302, Pittsburgh, PA 15242; PO Box 11522, Huntsville, AL 35814; PO Box 1464, Manomet, MA 02345; and PO Box 293, Merlin, Ontario N0P 1W0.

Thanks!

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We appreciate material sent in this month by Shawn Axelrod, Winnipeg, Manitoba; Ranier Brandt, Hoefer, Germany; Michael Clark; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Ulis Fleming, Glen Burnie, MD; Harold Frodge, Midland, MI; Paul Griffin, San Francisco, CA; William Hassig, Mt. Prospect, IL; Zacharias Liangas, Italy; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Garfield Morris; Dick Pearce, Brattleboro, VT; Mike Prindle, New Suffolk, NY; Al Quaglieri, Albany, NY; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; DJ Stevie, Basel, Switzerland; and Niel Wolfish, Toronto, Ontario.

BELOW 500 KHZ

DXING THE BASEMENT BAND

Kevin Carey, WB2QMY
lowband@gateway.net

Longwave Online

For a long time, a rivalry seemed to be shaping up between radio and the Internet. Today, however, most discussion centers around ways that the Net can be a resource to the radio hobby. You needn't choose between one or the other activity!

An Internet resource I recommend for low frequency (LF) enthusiasts is the "lowfer" listserver sponsored by Al Walker, K3TKJ. List subscribers send their comments to a "hub" computer which in turn "reflects" these messages to the entire group. The result is a near-real-time forum for exchanging ideas, asking questions, or just reading the mail. I have found this group (now numbering about 200) to be most helpful and friendly.

Subscribing to the list is free. Just send an e-mail message to **majordomo@qth.net** and place the words "**subscribe lowfer**" in the body of the message. (The subject line should be left blank.) After a short wait you will receive easy-to-follow instructions for joining the group.

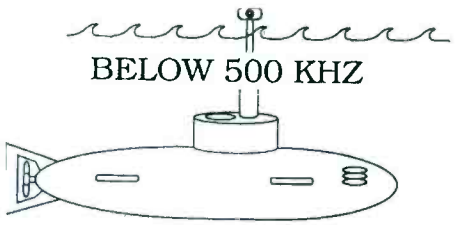
Rochester Hamfest—June 3-5

Without a doubt, one of the biggest radio gatherings in the Northeastern U.S. is the Rochester (NY) Hamfest. This year's hamfest will be held June 3-5, and as usual, I plan to be there. (I've only missed one Rochester fest in 22 years, and that was the day of my wedding!)

For many years an informal gathering of lowfers has met at the hamfest on Saturday afternoon. I'd like to extend an invitation to all *MT* readers to join us at this year's meet. Just drop me a note for details. More information on the hamfest can be found online at: **http://www.rochesterhamfest.org/rochester.asp**. Hope to see you there.

Loggings

Loggings this month are from Jacques d'Avignon (ON) and first-time contributor Alan Sifford (TX). Thanks to both Jacques and Alan for their interesting logs. Loggings are always welcome at *Below 500 kHz*.



Send your intercepts to me c/o *Monitoring Times*, P.O. Box 98, Brasstown, NC 28902.

I don't believe in setting lots of rules for loggings, but if catches are listed in the general order shown below, it will go a long way toward helping me prepare the column. This applies to e-mail as well as regular postal submittals. I look forward to hearing from you.

TABLE 1. SELECTED LOGGINGS

FREQ.	ID	LOCATION	BY
11.7	--	Russia (Alpha sys.)	J.D. (ON)
176	KRY	Chardon, OH	J.D. (ON)
189	QYV	Donora, PA	J.D. (ON)
194	TUK	Nantucket, MA	J.D. (ON)
205	XZ	Wawa, ON	J.D. (ON)
206	QI	Yarmouth, NS	J.D. (ON)
206	GLS	Galveston, TX	J.D. (ON)
212	BAZ	New Braunfels, TX	A.S. (TX)
213	YRC	St Honore, QC	J.D. (ON)
218	RL	Red Lake, ON	J.D. (ON)
219	OQ	Indianapolis, IN	J.D. (ON)
220	BX	Blanc Sablon, QC	J.D. (ON)
223	YYW	Armstrong, ON	J.D. (ON)
224	X	Montreal, QC	J.D. (ON)
224	II	Sturgeon Falls, WI	J.D. (ON)
226	EZE	Cleveland, OH	J.D. (ON)
230	BU	Columbus, OH	J.D. (ON)
230	QB	Quebec, QC	J.D. (ON)
232	QN	Nakina, ON	J.D. (ON)
233	PDR	Ottawa, OH	J.D. (ON)
236	GNI	Grand Isle, LA	J.D. (ON)
239	VO	Val d'Or, QC	J.D. (ON)
243	OZW	Howell, MI	J.D. (ON)
243	YVB	Bonaventure, QC	J.D. (ON)
246	DFI	Defiance, OH	J.D. (ON)
251	MNZ	Hamilton, TX	A.S. (TX)
255	BS	Austin, TX	A.S. (TX)
258	ORJ	Corry, PA	J.D. (ON)
260	PYA	Penn Yan, NY	J.D. (ON)
260	AVZ	Terrell, TX	A.S. (TX)
261	GD	Goderich, ON	J.D. (ON)
266	B	Hamilton, ON	J.D. (ON)
275	HPY	Baytown, TX	A.S. (TX)
275	PEZ	Pleasanton, TX	A.S. (TX)
280	GZV	Graford, TX	A.S. (TX)
281	UVA	Uvalde, TX	A.S. (TX)
286	EYQ	Houston, TX	A.S. (TX)
286	BEA	Beeville, TX	A.S. (TX)
286	EYQ	Houston, TX	A.S. (TX)
289	YLQ	La Tuque, QC	J.D. (ON)
305	RO	Roswell, NM	A.S. (TX)
317	I	Montreal, QC	J.D. (ON)
326	MA	Midland, TX	A.S. (TX)
329	HMA	Hondo, TX	A.S. (TX)
329	TAD	Trinidad, CO	A.S. (TX)
330	GLE	Gainsville, Tx	A.S. (TX)
332	CZX	Crosbyton, TX	A.S. (TX)
332	GUO	Georgetown, TX	A.S. (TX)
337	CVB	Castroville, TX	A.S. (TX)
343	6R	Bromont, QC	J.D. (ON)
344	O	Ottawa, ON	J.D. (ON)
344	GNC	Seminole, TX	A.S. (TX)
348	TKB	Kingsville, TX	A.S. (TX)
350	LE	Ralelgh, NC	J.D. (ON)
350	OKT	Yoakum, TX	A.S. (TX)
350	RG	Oklahoma City, OK	A.S. (TX)
351	YKQ	Waskaganish, QC	J.D. (ON)
353	LLX	Lyndonville, VT	J.D. (ON)
353	HOT	Higuerote, Venz.	J.D. (ON)
354	Z	Sept Iles, QC	J.D. (ON)
356	YZD	Downsview, ON	J.D. (ON)
359	HHH	Devine, TX	A.S. (TX)
360	PN	Port Menier, QC	J.D. (ON)
362	BNH	Brenham, TX	A.S. (TX)
363	SB	Sudbury, ON	J.D. (ON)
365	FT	Ft. Worth, TX	A.S. (TX)
368	AN	San Antonio, TX	A.S. (TX)
371	GW	Kuujjurapik, QC	J.D. (ON)
373	3Q	Mont Laurier, QC	J.D. (ON)
375	7B	St Thomas, ON	J.D. (ON)
379	DL	Duluth, MN	J.D. (ON)
380	BBD	Brady, TX	A.S. (TX)
382	CR	Corpus Christi, Tx	A.S. (TX)
383	D9	Deerhurst, ON	J.D. (ON)
385	CPZ	La Pryor, TX	A.S. (TX)
388	DT	Detroit, MI	J.D. (ON)
388	JUG	Seagoville, TX	A.S. (TX)
390	JT	Stephenville, NF	J.D. (ON)
391	DDP	Dorado, PR	J.D. (ON)
391	GXD	Nacogoches, TX	A.S. (TX)
392	A	Hamilton, ON	J.D. (ON)
396	PH	Inukjuak, QC	J.D. (ON)
396	CQB	Chandler, OK	A.S. (TX)
400	G	Charlottetown, PE	J.D. (ON)
419	RYS	Detroit, MI	J.D. (ON)
450	PPA	Puerto Plata, Dom.	J.D. (ON)
510	OF	Carsy, NE	J.D. (ON)
512	HMY	Lexington, OK	J.D. (ON)
513	PP	Omaha, NE	J.D. (ON)
515	OS	Columbus, OH	J.D. (ON)
515	RRQ	Rock Rapids, IA	J.D. (ON)

In addition to his loggings, Alan Sifford passed along a web site with instructions for deactivating the "chuffing mute" that occurs while tuning a Realistic DX398 (or Sangean ATS909). You'll find these instructions at: **http://members.aol.com/rickw999/san.htm**

See you next month.

Marine Radio Monitoring

Looking for frequencies you can plug right in to your scanner? "Service Search" is a column we offer to *MT* readers which will provide frequencies of general interest throughout the U.S. If there's a service you'd like to know more about, send your request to the Editor at *Monitoring Times* or email mteditor@grove-ent.com.

More scanner frequencies and information can now be found on the *MT* web site as well. You'll find spectrum allocation charts, the new FCC Service code chart (useful if you purchased the 1998 FCC database), and we've resurrected the "Frequency Exchange" as an online version. Check it out and see who has posted their favorite list; then submit your own!

U.S. VHF MARINE RADIO CHANNELS AND FREQUENCIES

COURTESY OF THE UNITED STATES COAST GUARD

Chnl	Ship Transmit (MHz)	Ship Receive (MHz)	Use
01A	156.050	156.050	Port Operations and Commercial. VTS in selected areas.
05A	156.250	156.250	Port Operations. VTS in Seattle
06	156.300	156.300	Intership Safety
07A	156.350	156.350	Commercial
08	156.400	156.400	Commercial (Intership only)
09	156.450	156.450	Boater Calling. Commercial and Non-Commercial.
10	156.500	156.500	Commercial
11	156.550	156.550	Commercial. VTS in selected areas.
12	156.600	156.600	Port Operations. VTS in selected areas.
13	156.650	156.650	Intership Navigation Safety (Bridge-to-bridge). Ships >20m length maintain a listening watch on this channel in US waters.
14	156.700	156.700	Port Operations. VTS in selected areas.
15	--	156.750	Environmental (Receive only). Used by Class C EPIRBs.
16	156.800	156.800	International Distress, Safety and Calling. Ships required to carry radio, USCG, and most coast stations maintain a listening watch on this channel.
17	156.850	156.850	State Control
18A	156.900	156.900	Commercial
19A	156.950	156.950	Commercial
20	157.000	161.600	Port Operations (duplex)
20A	157.000	157.000	Port Operations
21A	157.050	157.050	U.S. Coast Guard only
22A	157.100	157.100	Coast Guard Liaison and Maritime Safety Information Broadcasts. Broadcasts announced on channel 16.
23A	157.150	157.150	U.S. Coast Guard only
24	157.200	161.800	Public Correspondence (Marine Operator)
25	157.250	161.850	Public Correspondence (Marine Operator)
26	157.300	161.900	Public Correspondence (Marine Operator)
27	157.350	161.950	Public Correspondence (Marine Operator)
28	157.400	162.000	Public Correspondence (Marine Operator)
63A	156.175	156.175	Port Operations and Commercial. VTS in selected areas.
65A	156.275	156.275	Port Operations
66A	156.325	156.325	Port Operations
67	156.375	156.375	Commercial. Used for Bridge-to-bridge communications in lower Mississippi River. Intership only.
68	156.425	156.425	Non-Commercial
69	156.475	156.475	Non-Commercial
70	156.525	156.525	Digital Selective Calling (voice communications not allowed)
71	156.575	156.575	Non-Commercial
72	156.625	156.625	Non-Commercial (Intership only)
73	156.675	156.675	Port Operations
74	156.725	156.725	Port Operations
77	156.875	156.875	Port Operations (Intership only)
78A	156.925	156.925	Non-Commercial
79A	156.975	156.975	Commercial
80A	157.025	157.025	Commercial
81A	157.075	157.075	U.S. Government only - Environmental protection operations.
82A	157.125	157.125	U.S. Government only
83A	157.175	157.175	U.S. Coast Guard only
84	157.225	161.825	Public Correspondence (Marine Operator)
85	157.275	161.875	Public Correspondence (Marine Operator)
86	157.325	161.925	Public Correspondence (Marine Operator)
87	157.375	161.975	Public Correspondence (Marine Operator)
88	157.425	162.025	Public Correspondence only near Canadian border.
88A	157.425	157.425	Commercial, Intership only.

NOAA WEATHER RADIO FREQUENCIES (MHZ)

WX1	162.550
WX2	162.400
WX3	162.475
WX4	162.425
WX5	162.450
WX6	162.500
WX7	162.525

Frequencies are in MHz. Modulation is narrowband FM.

Note that the letter "A" indicates simplex use of the ship station transmit side of an international duplex channel, and that operations are different than international operations on that channel. Some VHF transceivers are equipped with an "International - U.S." switch for that purpose. "A" channels are generally only used in the United States, and use is normally not recognized or allowed outside the U.S. The letter "B" indicates simplex use of the coast station transmit side of an international duplex channel. The U.S. does not currently use "B" channels for simplex communications in this band.

Boaters should normally use channels listed as Non-Commercial. Channel 16 is used for calling other stations or for distress alerting. Channel 13 should be used to contact a ship when there is danger of collision. All ships of length 20m or greater are required to guard VHF channel 13, in addition to VHF channel 16, when operating within U.S. territorial waters. Users may be fined by the FCC for improper use of these channels.

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More Mobile Station Solutions

May, June and July are great months to get out and see the sights from your automobile or camper. I know that our family can hardly wait to hitch up our camper and enjoy the great outdoors. Taking your radio hobby along on the road need not be a problem if you approach the task in a logical manner and employ the **K.I.S. Radio** philosophy.

As a ham radio operator I gladly accept the challenges associated with putting a small, low power (QRP) station on the air from my truck or campsite. I also pack along a small Sony ICF-7600W shortwave receiver and a current copy of the *World Radio TV Handbook*. Being away from major cities and their associated noise sources allows me to DX the SW bands and log some semi-rare stations.

For all you scanner-oriented folks out there, traveling and camping can yield some great VHF/UHF catches — the State Game Commission, State Police, US Forest Service and rural volunteer fire companies. Commercial campsites often use VHF/UHF itinerant frequencies.

Planning for a camping trip or vacation is much like planning for a communications emergency. The idea is to be as self-sufficient and flexible as possible in your radio equipment and antennas. Since both my Subaru Outback and my Ford F-150 truck carry 2 meter radio gear, CB equipment and scanners, there is little preparation I need to do for the action bands. HF is a different matter entirely.

The Skyhook Dilemma

By its nature, HF portable/mobile operation takes a lot more planning. The first thing you are sure to notice is the size of the antennas. Except for 10 meters, all HF mobile/portable antennas are a compromise, because of the physical lengths involved. The lower in the HF spectrum you operate, the longer your antennas have to be. Below 10 meters, your antennas will be some form of electrically shortened radiator. This normally takes the form of a coil of wire either at the base or midway up the antenna mast.

Over the years I have used the Hustler mobile whip system, which is a classic coil loaded antenna. I switched to the monoband Hamstick™ design several years ago and have had much better results using these helically wound antennas on 40 and 20 meters.

Last year I obtained an Outbacker Outreach™ multiband mobile whip for the Subaru Outback. This nine foot monster is a *very* nice antenna which works amazingly well on 80 through 10 meters, although you will need an antenna tuner in order to reach the low end of the bands. Band changes take less than a minute.

The Outbacker Outreach is imported from Australia where the initial design has been in use for many years. In order to survive in that hostile environment, antennas must be rugged. One look at the Outreach and you know instantly that this one is! (Fig. 1)

FIG 1 - *The Outbacker Outreach is affixed to the custom mount on my Subaru Outback SUV wagon. This rugged antenna is approx 9-ft long - "low profile" it ain't!*

The helically wound portion of the antenna is a whopping six feet long! Add the three foot adjustable whip ("stinger") and you end up with a nine foot long multiband HF mobile antenna that plays extremely well. But, this is one antenna you are not going to put on a wimpy antenna mount and expect it to stay put. Outbacker sells a very rugged mount for their beast, but I decided to go with a custom mount since I had the local talent available. A friend of mine who is a commercial welder by trade custom fabricated the mounts on both my vehicles (Fig #2).

FIG 2 - *A closer look at the actual mount. The oversized thread coupling is courtesy of Truck Stops of America. The actual mount is constructed from steel rod and flat stock. The mount is secured to the side of the Class-II trailer hitch which is also bolted to the frame of the Subaru. The mount, hitch, and frame are electrically bonded together to provide a good ground connection to the frame of the vehicle. RG-8X coax is used in this installation and you can see the Coax-Seal molded to the underside of the antenna mount/coaxial fitting for waterproofing.*

You're Gonna Hang It Where ?

HF antennas for use at the campsite can take on various forms. I prefer dipole antennas, since they are low profile, simple to construct and erect as inverted vees. Some friends of mine use multiband trapped verticals on their campers. These are fine, provided you use radial counterpoise wires.

Don't forget the old standby: the end fed wire. These are simple and require only one counterpoise wire attached to the tuner to make them play as a multiband antenna. End fed wires are the antenna of choice by back

packers and hikers, where ounces count!

Unfortunately, modern pickup trucks (and cars, too) offer little in the way of spaces to mount equipment and antennas. In the instance of the F-150, double wall construction throughout is a deterrent to mounting antenna hardware anywhere on the body. The Antenna Specialists Mosaic™ 2 meter VHF antenna (Fig#3) mounted in the center of the cab roof, required about an hour of "fishing" in order to get the coaxial cable down the side of the cab between the double walls.

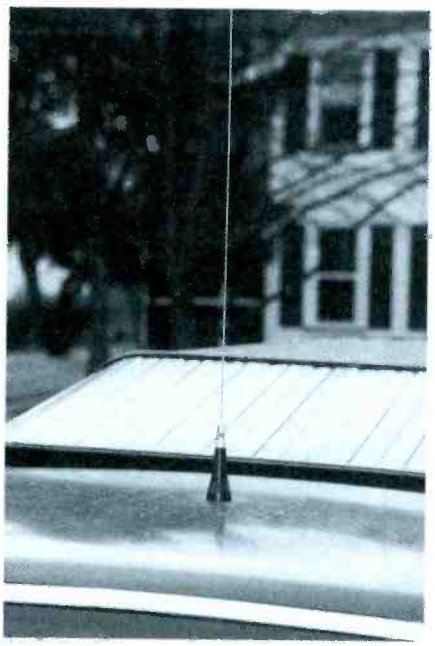


FIG 3 - *The Antenna Specialists "Mosaic" VHF (2 meter) 5/8 wave mobile whip on the roof of my Ford F-150 pick-up truck. This VHF gain antenna enables me to cover all the local 2 meter repeaters in this area using only 5 watts. The rugged Mosaic mounts in a 3/4 inch hole. The lower portion of this antenna is made of a rubberized material that covers a spring to enable the antenna to survive being smacked by branches and low overhangs.*

Thankfully, George Ganis, WB3FKQ, has a good sense of humor and a *lot* of experience in mobile radio installation; otherwise, I would have mounted the 2 meter antenna on a lip mount along the side of the hood! As it sits now, this VHF antenna works unbelievably well, providing maximum coverage of the local area repeaters using only 5 watts from the ICOM IC-28H.

Speaking of mounting rigs, I swear that somebody sits up late at night thinking of ways to deter hams and scanner buffs from mounting our gear in vehicles! Full size pickup trucks have lots of room in the cab, right? Therefore, I should have plenty of room to mount radio gear, right? *Wrong!* Actually, the F-150 proved to be a lot more challenging from an equipment mounting standpoint than the Subaru.

HO, HO, HO! Merry Christmas!

Enter the "Christmas Tree." Several of the local hams had similar problems, and their collective solution was to get a pedestal mount system that consisted of a central mast and one or more horizontal pieces that were height adjustable up and down the pedestal, where gear could be secured for easy use.

Bob Reynolds, WB3DYE, kindly allowed me to eyeball the "Christmas Tree" mount in his Geo Tracker. Since Bob works as a reporter for WNEP-TV, he also mounts a lot of scanning gear in his mobile rig along with a 10 meter multimode transceiver and, of course, 2 meters.

Armed with information about Bob's installation, I was able to sketch out what I needed and a retired machinist neighbor of mine fabricated my "Christmas Tree" mount from T-6061 aluminum bar stock. This equipment stand is mounted in the cab of the F-150 (Fig #4) by bolting it to the transmission hump, slightly off center. The radio gear is hung on the side mounting support bar. A second horizontal support bar can be added for more gear.

FIG 4 - *My answer to a $100+ commercial radio mounting ystem. This "Christmas Tree" mount is made from T-6061 aluminum bar stock. Notice that I have managed to hang three radios on the first cross piece. The 2 meter rig sits on top with a Radio Shack CB set underneath. Mounted to the bottom of the CB is a Radio Shack scanner. There will be a second cross piece added below the scanner to hold the GE Ranger-II 6 meter rig and a SGC-2020 HF transceiver.*

Eventually, I plan on adding HF single side band (SSB) capabilities in the form of an SGC-2020 CW/SSB HF transceiver along with a 6 meter GE Ranger-II. These two rigs will fill the second support bar and make for a tidy equipment installation.

What Price Stealth ?

In a previous column, I stressed the need for concealment and stealth with regard to mobile installations. Unfortunately, this is not possible with a pick-up truck — in my case, anyway. Therefore, rig insurance is a must. There are several companies specializing in insuring radio gear (less antennas, towers and rotors) and the premium is not all that outrageous, considering the alternatives. Check out the ARRL's radio insurance program, and the back of *QST* and *CQ* magazines for other companies that offer insurance protection for your radio gear.

Power, Power and More Power

Power is a major concern, especially when going mobile or portable. If at all possible, go directly to the vehicle battery with the radio power cords. This will greatly reduce the amount of interference and noise pickup from various automotive subsystems inside the vehicle. Also, by going directly to the battery, the chances of RF energy being coupled into the wiring harness of the vehicle is greatly reduced.

Power for my portable gear while in the camper is provided by a deep cycle marine battery on the trailer hitch of the camper. For tent camping or operations from a hotel/motel I use a portable "Power Station" gell-cell power unit. These normally sell for about $50, but Tech America had them on sale a few months ago for $25.

These portable power sources have a 7 amp hour gell-cell battery and charging circuitry enclosed in a high impact plastic carrying case. There are two 12 volt dc cigarette lighter jack outputs on the front along with a dc voltmeter to monitor battery condition. Each jack has a separate switch for power on/off.

The back of the Power Station has a high current 12 volt dc output that is not switched. An external charger plugs into the wall to recharge the Power Station at home, or you can recharge it from your vehicle via a handy cigarette lighter plug adaptor, while on the go. In all, the Power Station is a great little accessory to insure that you have power when and where you need it for portable operation.

That's a wrap for now. Remember, when you take it on the road, Keep It Simple!

Bill Cheek
email: bcheek@comtronics.net

Build a Four-Level FSK Data Decoder Interface

In this issue we present the promised Four-Level FSK Data Decoder Interface (4LFSKDDI) that, with a freeware program, can decode a few of those elusive and mysterious signals out there on the airwaves. The 4LFSKDDI can be built by most hobbyists, and the software is a no-brainer. Readers are cautioned that decoding certain Four-Level FSK signals could be illegal, depending on where you reside. Get informed before proceeding.

See my column last month for the necessary dual polarity power supply. Since then, I learned that power requirements aren't so critical, but ±15V is the max. Greater than ±11V should be regulated, but lower can be unregulated so long as it is reasonably stable. ±5V is an absolute minimum.

A pair of 9V DC adapters or 9V batteries can be perfect for the 4LFSKDDI. The important thing is to measure your intended power supplies before connecting them to the circuit. See my May-97, Jul-98, Aug-98, and Feb-99 *MT* columns for important (but not essential) background information, particularly on the simpler 2-Level FSK data decoder interfaces and processes.

You will need an 800-940 MHz scanner (cellular not required) with the NFM discriminator/baseband audio mod installed and known to be functional. See my Jul-98 column to do this modification to most any scanner. My Web site at: **http://ourworld.compuserve.com/homepages/bcheek/scandata.txt** always offers the latest on this baseband audio mod. See Table 1 for the Parts List.

Getting Started

Cut a piece of perfboard 18 complete holes long by 15 complete holes wide. This size supports the circuit perfectly and fits either of the suggested enclosures. If you choose the #270-283 project box, don't use the circuit board that comes with it. Save that board for another project.

Follow Figures 1 and 2 for the broad details of constructing the circuit. Begin by removing Pin 13 of the IC socket that will be used for U2. You can even cut Pin 13 away from the LM339 chip, too. It's not needed, but the empty space for it on the wiring side of the board comes in handy.

Install the IC sockets first, then solder bare 22-24 ga wire "traces" among the appropriate IC pins, for example: U1 pins 5, 10, 13 & 14; U2 pins 5, 7, & 9; U2 pins 10-11; and U1 Pin 5 to U2 pin 7. This secures the sockets to the board to keep them from falling out.

Install and solder jumpers JU1 and JU2. One end of JU1 has to be left open until later in the construction. JU3 and JU4 can be added later.

Now begin in earnest by installing and soldering R2, C1, R1, C2, C6, R5 and D2, in that order. First, bend the leads of resistors and diodes at right angles, as close to their bodies as possible. Use a flat-blade jeweler's screwdriver to bend component leads on the wiring side of the board.

Use protruding component leads as "traces" where possible (most of the time.) After a component is installed flush with the board, sharply bend its protruding leads on the wiring side in the general direction of the "trace" it should follow. Solder at least one end in place to hold the component before installing another one.

FIG-1: 4-LEVEL FSK DATA DECODER INTERFACE SCHEMATIC

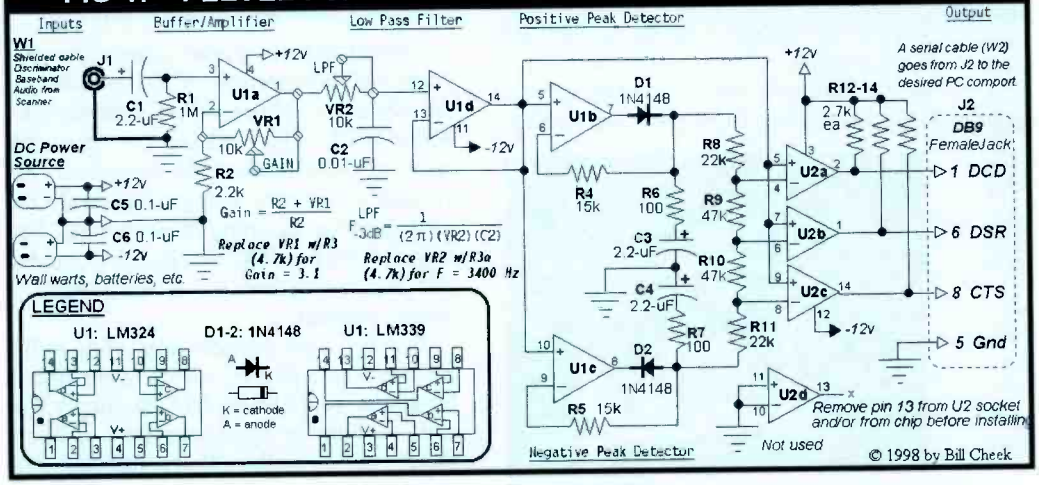
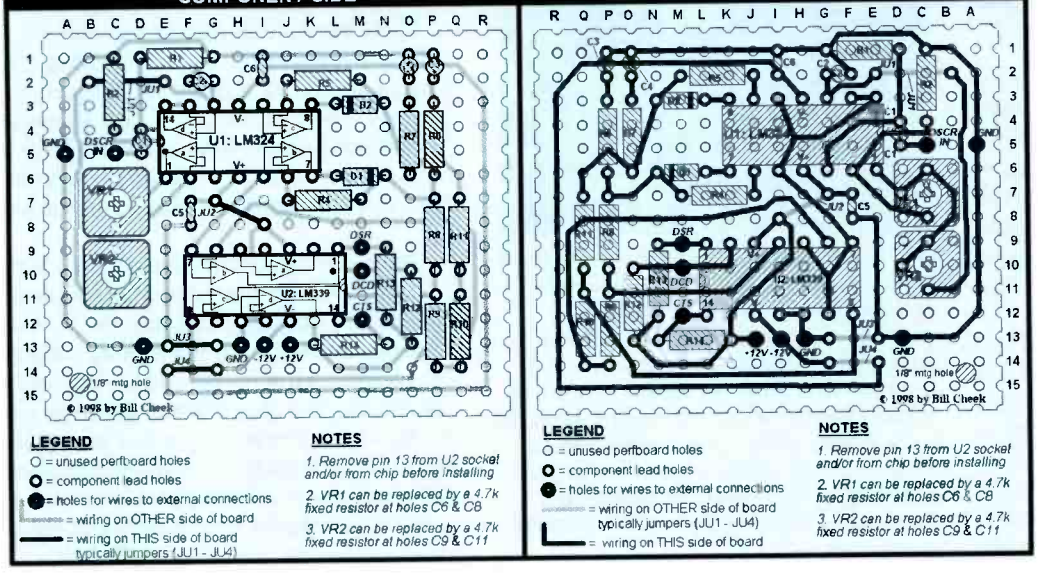


FIG-2: 4-LEVEL FSK DATA DECODER INTERFACE CONSTRUCTION GUIDE



Starting with R2, C1, R1, C2, C6, R5 and D2 as instructed above, install components, one at a time, working in and completing one area at a time. Work in a clockwise direction around the board. Where possible, tightly bend the leads on the solder side and route them as traces, instead of clipping them.

Follow the wiring and parts-placement patterns shown in Figure 2. Shorter traces will "rigidize" after soldering. Don't make anything permanent until after the board is tested and proved up. Observe polarity of diodes and electrolytic capacitors. Ensure IC's are correctly installed, per Pin 1 references.

Preset the adjustments of the two trim pots (VR1 & VR2) to midway between the ends. NOTE: the trim pots aren't absolutely essential. They can be replaced with 4.7k fixed resistors. (See Notes 2 and 3 in Fig-2.) VR1 sets the gain of U1a while VR2 is a Low Pass Filter adjustment for U1d.

Connect the 4LFSKDDI

Wire the outputs of the 4LFSKDDI to a female DB9 jack. Wire an RCA jack to feed the input to the 4LFSKDDI. Connect an ordinary shielded audio patch cable from the RCA jack to the NFM baseband audio output on your scanner. If needed, add a plug or adapter on this end of the cable to mate with the scanner's baseband audio jack.

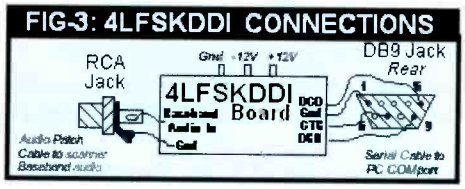
Connect a shielded straight-thru serial cable with a male DB9 plug to the 4LFSKDDI's female DB-9 jack. The other end of this serial cable should have a female DB9 (or DB25) plug (or adapter) to mate to the desired COMport on the PC.

The ± power supply can be connected in any number of ways, from the old fashioned hard-wired method to perhaps a stereo jack and plug with the shell grounded; -V on the ring and +V on the tip. A pair of monaural jacks with common grounds will work; +V on one center and -V on the other. Just don't reverse the +/- power polarities; the IC's will blow. Figure 3 illustrates the necessary connections.

TABLE 1: 4LFSK PARTS LIST

Ckt Sym	Qty	Description	Radio Shack #
U1	1	LM324 Quad Op-amp	276-1711
U2	1	LM339 Quad Comparator	276-1712
C1,3,4	3	capacitor; 2.2-uF/35v, tant	RSU11295888
C2	1	capacitor; 0.01-uF	272-1065
C5,6	2	capacitor; 0.1-uF	276-109
D1-2	2	diode; 1N914/1N4148	276-1620
R1	1	resistor; 1-M	271-1356
R2	1	resistor; 2.2k	271-1325
R4-5	2	resistor; 15K	271-1337
R6-7	2	resistor; 100	271-1311
R8,11	2	resistor; 22K	271-1339
R9,10	2	resistor; 47K	271-1342
R12-14	3	resistor; 2.7K	RSU11344942
J1	1	RCA Jack	274-346
J2	1	DB9 Jack (female)	276-1538
	1	Perfboard:18 x 15 holes	276-1394-6
VR1-2	2	Trimmer pot; 10K, mini *(See R3 & R3a below)*	271-282
		Optional and Peripheral Items	
*R3, 3a	2	resistor; 4.7k	* 271-1330
A1	1	Enclosure	270-1802, 270-283A
W1	3ft	Shielded audio cable	42-2370
W2	6ft	Shielded serial cable (6' DB9 female/DB9 male cable)	26-117
	2	IC socket; 14 pin DIP	276-1999

* Can be used in place of VR1 & VR2



Wrap-up and Loose Ends

The circuit has been extensively field-tested and proved, so be patient. Use a bright light and a strong magnifier to examine your work as you go! Common errors include missing traces and jumpers, reverse polarity of capacitors and diodes; cold solder joints; and solder-blobs or short-circuits in tight places. Despite the high-density design, cramped quarters are few, largely in the vicinity of U2 pins 3-5, U1 pin 12, C1, R2, and some of the area between U1 and U2.

Most "traces" are rigid once soldered at each end, but a few might be "wiggly" unless anchored in some manner. Pay special attention to traces E14-I2, F12-Q11, E13-P1, and H9-Q14. Anchoring can be with super-glue, hot glue, or even loops of wire passed through holes on either side of a trace, for instance at holes B12 and A13 to anchor the corner of trace E13-P1.

For detailed information on hobby circuit building, including pcb-making, see my four-part series, "Cool Ways to Design Circuits," Apr-96 through Jul-96. *MT* offers low-cost reprints if you don't have those issues.

Test the 4LFSKDDI

Download POCFLEX.ZIP from the following site:

http://www.geocities.com/CapeCanaveral/Launchpad/4039/PINFO.HTM

Docs and insider information at this site make this program an excellent test platform for the 4LFSKDDI, if legal in your area. Unzip the POCFLEX.ZIP archive into a new directory, say: \4LFSK

Review the contents, especially the *.htm files, which are the docs for this program. For a quick-start, follow the next five steps exactly:

1. Set the scanner to searching the 928.0-932.0 MHz band segment.
   A. Connect the baseband audio output of the scanner to the RCA jack on the 4LFSKDDI
   B. Don't power up the 4LFSKDDI at this time.
2. Edit the POCFLEX.INI file in the \4LFSKDDI directory as follows:
   TWOLEVELINT = 0
   SPORT = 2 *(See NOTE 1 below)*
   RCVPOLARITY = 0
   SHOWNUMERIC = 1
   SHOWMISC = 1
   TIMESTAMP = 1
   KILL_LF = 0
   prn_echo = 0
   lpt_port = 0
   screenmode = 2

NOTE 1: Make all settings exactly as shown above except for the SPORT = 2 line. Change the "2" to match the COMport (1-4) used by your 4LFSKDDI.

3. Edit the file called FILTER.INI as follows:
   textscan = 1
   scannumeric = 1
   scanaddr = 1
   filtfile = 1
   WINSIZE = 50
   beepfreq = 11000
   beeplen = 3

NOTE 2: Make all settings exactly as shown above.

NOTE 3: The POCFLEX.INI and FILTER.INI files are the configuration settings for the POCFLEX program. If you don't understand config files or don't know how to edit this type of file, you'll need to seek outside help. Make sure each of these two files contains the settings exactly as shown or discussed above. You can change them later to suit.

4. Power up the 4LFSKDDI.
5. Run pocflex.exe from a DOS command prompt, or from Win95/98 in a DOS window.

Make sure the scanner has stopped on an appropriate data signal (the 928-932 MHz band is loaded with appropriate data signals). If all is well, data should appear on the screen in a few seconds. If not, don't panic. Is the scanner on a data signal, and is the signal carrying data? Sometimes, these signals are "silent" between data bursts with clear tones. You can tell when data is present; check to be sure.

If all is well with the signal, but no data appears, then check the settings of the *.INI configuration files. Check all electrical connections and check for errors in the wiring of the connections, especially the DB9 wiring and the ± power polarity. Obviously, check the 4LFSKDDI board, too.

Support for this and all my columns is freely available by e-mail. If you're not computerized, please include an SASE with postal requests.

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A Survey of Direction Finding Techniques and Antennas

The field of radio direction finding (RDF) is actually almost as old as wireless or radio itself. And in this electronic age where global-positioning technology can easily tell us our location anywhere on earth with great accuracy, it is easy to overlook the tremendous service which RDF, even in its simpler forms, has rendered to mankind over the years.

Its applications range from locating distressed ships at sea, to helping pilots return their plane safely home, to finding sources of radio interference, to locating pirate radio stations, and even to zeroing-in on enemy transmitters in wartime. And we mustn't overlook the fun amateur radio operators have with their hidden transmitter hunts as they search for the "fox."

In scientific research, RDF techniques have helped us come to understand such vagaries of radio wave propagation as the fact that some signals depart from great-circle paths, what vertical angles waves are arriving from, and from whence come the strange echo signals that have perplexed radio operators from time immemorial (well, for a long time, anyhow). All in all, RDF is a very interesting field with much to offer the radio enthusiast.

A Brief History of Radio Direction Finding

Directional antennas have been around ever since the late 1800s when Hertz, who first demonstrated electromagnetic waves, used the dielectric lens and the parabolic-dish reflector antenna. (What? You thought the dish antenna was recent technology?!) Later in the 1800s, Marconi also utilized parabolic reflectors for some of his wireless systems. In 1900 Zenneck, the "German Marconi," experimented with directional antenna designs but, for some reason, discontinued what looked like promising work in this area.

Dunlap, in his *Radio's 100 Men of Science*, says "Many are mentioned as the 'inventor' of the radio compass, among them Fessenden, Pickard, John Stone Stone, Capt. H. J. Rounds, Francis W. Dunmore, Percival D. Lowell, R. L. Rose-Smith, and Bellini-Tosi, but generally Kolster is credited with having built a practical device; that others had observed and realized the directional properties of wireless is conceded."

Unfortunately, early receivers were so insensitive that RDF techniques were effective only up to a few miles. However, once the triode vacuum tube was discovered, much more sensitive receivers were possible. Subsequent to this improvement the systems of Bellini and Tosi, and of Pickard, were heavily utilized in early RDF work.

Bellini and Tosi, following up on work by Artom, had developed an RDF system (fig. 1A) utilizing two crossed, fixed-position loops connected to a "radio-frequency transformer with a rotatable secondary winding." This transformer, called a "goniometer," coupled the signals from the antenna loops to the receiver.

The goniometer had a rotatable secondary winding which, when rotated for the loudest signal, indicated the direction of a line which intersected the location of the transmitting antenna. However, it was impossible to say in which direction along this line (toward which of the line's ends) the transmitting antenna

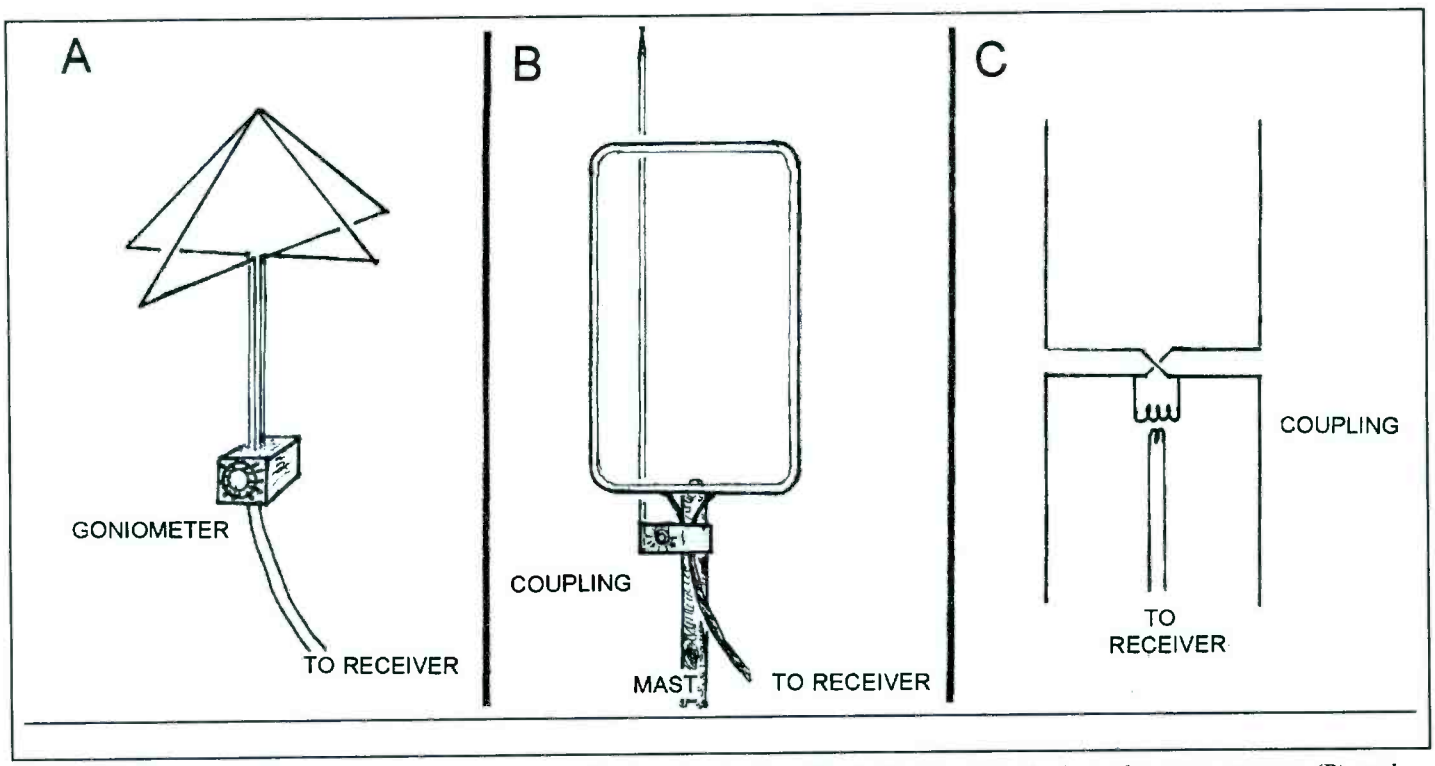

FIG. 1. *Three antennas which have been important in radio direction-finding. The Bellini-Tosi (A), the loop-plus-sense-antenna (B), and the Adcock (C).*

lay. Only by taking separate readings from two separate locations could the transmitting antenna's location be determined. Its location was the intersection of the two directional lines indicated by the goniometers.

Picard developed a loop-plus-sense-antenna (fig. 1B). Its cardioid (heart-shaped) response pattern gave a non-ambiguous, unidirectional indication of the direction from which signals arrived. This was a great advantage, and the design is still frequently utilized (see any *ARRL Antenna Book* for how to build one)..

During the first world war the wireless pioneer Fessenden worked out an RDF system using two widely separated loop antennas. By this means the British were able to locate German Zeppelins via the Zeppelin's radio signals, and report their positions to the British air force long before the Zeppelins arrived over England. The British were also able to RDF the movement of German battleships with such great accuracy that by monitoring a ship's wireless activity from their monitoring stations in Britain they were able to detect German ship movements while the ships were still *within the German ports.*

Subsequent to those earlier systems the Adcock antenna (fig. 1C) was developed to reduce signal polarization errors common on high frequency, and was heavily utilized in RDF work. Marconi had earlier developed an RDF antenna system composed of a number of inverted-L antennas radially spaced around a circle. The elements were sampled by a rotary switching arrangement, and the antenna producing the loudest signal was assumed to be pointing at the source of the signal.

A more recent RDF system which also uses rotary sampling of antennas arranged in a circle is the Wullenweber, or "elephant cage" antenna. This antenna covered a circle 900 feet in diameter, had a central, circular shield-screen 120 feet high, and 96 vertical antenna elements each over 100 feet tall!

More recently the Doppler effect has been exploited to produce some rather sophisticated RDF units. By sampling the signal from a set of several physically-separated antennas it is possible to determine the direction of wave arrival fairly precisely. We should note that position-indicating systems such as GPS and the older LORAN, although they are not strictly speaking RDF systems, are very accurate in helping locate one's position on the earth's surface.

Some Easy RDF Techniques

The loopstick antennas in most small AM receivers are quite directional. If you tune such a receiver to a radio station and then rotate the receiver horizontally, you will most likely find that the signal fades to a low level at two points in a complete rotation. These points are called "nulls," and they are quite narrow (i.e., you must position the radio precisely to null the signal). If the signal is strong you may not be able to get a good null due to the automatic gain control in the receiver. In this case try a weaker signal.

The nulls should occur along a line through the long dimension of the antenna's ferrite rod. Take a directional reading on one station at two widely separated locations. Plot these two directional lines on a local map, and the point where the lines cross will indicate the position of the transmitting antenna.

If you have a handheld transceiver or scanner operating on the VHF band or higher, you can RDF using just your body as the RDF accessory! Tune in the station you want to RDF, and hold the transceiver or scanner up to your chest. Standing upright, slowly turn in a complete circle. The signal will most likely fade as you face in the direction away from the transmitting antenna, and return to full volume as you face that direction.

On VHF and UHF many beam antennas are small enough to carry and manipulate easily by hand. With the typical beam you will rotate the antenna over your head while looking at your receiver's signal-strength meter for a maximum reading. Most beams have a fairly wide beamwidth, but they can give you a general idea of the transmitting antenna's direction.

RADIO RIDDLES

Last Month:

I said: "Antennas have been called by various names including 'skywires,' 'antlers,' 'signal grabbers,' and 'wings.' Heinrick Hertz called them 'conductors.' The British often use a different term for 'antenna.' What is that term? What is its origin?"

You probably guessed it correctly; the term is "aerial." This term originated from the fact that, for good reception, early wireless antennas had to be elevated high above the earth. "Aerial" means "high above the earth," thus the antenna was an "aerial wire." In time this was shortened to "aerial."

This Month:

Could RDF be used to track thunder storms?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, 73

ON THE HAM BANDS ...

THE FUNDAMENTALS OF AMATEUR RADIO

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SWLing for Hams

Many years ago, I became interested in listening in on the shortwave bands. It did not matter much what was on the bands; it was the mystery and adventure available that intrigued me. Listening to the friendly chatting on the HF ham bands attracted me to that hobby, but even after my ham ticket was hanging on the wall, listening still was fun and continues to be today.

My listening interests today are a bit different from those early days, in that I have developed a fairly ordered way of using the receiver. After many years of avidly operating on the air every minute I could manage, it became apparent that I was missing out on a lot of things. Shifting gears, I began engaging in a wider variety of interests and spending less time on the air or even listening.

Then I acquired a truly decent portable shortwave receiver (Sony 2010) that enabled me to listen from almost anywhere I pleased. Using the Sony I was able to tune in on SW whenever I wanted to, and check out the action. If there was something interesting on the ham bands, I could go to the shack and join in, or just listen to what was going on. In addition to tuning the ham bands, the maritime and air frequencies provide a lot of listening adventures, and the good old SW broadcast stations still are regular visitors in my home.

The second tool in my listening arsenal is a Radio Shack PRO 2040 scanner (though for many years I used a simple ten-channel handheld Uniden scanner). The scanner is used to monitor the VHF frequencies of a local ham intercom channel, local repeaters, and to monitor band openings on 10, 6 and 2 meters. I also check in on Fish and Game frequencies, local emergency, and weather.

Eleven-year-old Josh instructs two-year-old brother Lars on fine points of tuning the Sony 2010.

Antennas

Most of the time, I use the built-in whip on the 2010 for listening and when I'm not in the electronics room; however, I do have a good shortwave antenna outside when I want to get serious with weak signals. When the scanner is not in the electronics room the screw-in whip antenna provides adequate coverage for most local signals, but a six meter discone antenna on the roof allows superb coverage from 10 to 2 meters with the 2040. A vertical log periodic array was used for many years to allow receiving distant VHF stations under any conditions. This antenna has since been replaced with four-element cubical quad antennas for 6 and 2 meters (the quads are superior on their given bands, but leave a lot to be desired when tuning outside of their respective bands).

One last piece of equipment that I use for my wandering SWLing is a pair of Radio Shack communications headphones, RS # 20-282. These headphones are excellent for the SWLing or hamming, as they are quite light, incorporate a volume control built into one of the phones, and use foam-filled ear cushions to reduce external noise.

A side bonus to SWLing is the interest my three sons show in the hobby. My boys are all interested in sitting in the shack when possible and listening to Dad hamming, and they like to talk to my contacts on phone. Two-year old Lars has been chatting on the air since just after his second birthday. When I am in the shack he will actually grab the mike and call CQ. He may only say "Hi, my name is Lars, I'm two years old and like candy," but he sure enjoys hearing the voices talk to him from those boxes on Dad's table. See photo (Lars is the one wearing the Radio Shack headphones).

Flight of the Bumblebees

Some time back, I mentioned in this column that it would be fun to have a given day or days (i.e., first day of spring, summer, fall or winter) as a time when everyone with a portable rig would go to some place of natural beauty and operate from it and send out photo QSLs (verifications).

Well, the Amateur Radio Adventure Society has organized an event that is something like what I described. It is called the Flight of the Bumblebees and takes place on the last Sunday of July.

Stations called Bumblebees go to remote locations using QRP (low power) and work as many stations as possible during a four hour period. Everyone is invited to join in on this activity; but if you are interested in becoming a Bumblebee you must contact the amateur Radio Adventure Society and let them know of your interest and tell them where you will operate from. They will assign a Bumblebee number which is used in the exchange during the event. Send requests to Russ Carpenter, AA7QU; his e-mail address is russ@natworld.com. Keep the last Sunday in July open for this event; full details next month.

Speaking of e-mail, I have two e-mail addresses, n3ik@hotbot.com or n3ik@planetdirect.com. My old Zdial address is no longer valid (it was changed to the planet direct address). Keep the e-mail, cards and letters coming.

73 de Ike, N3IK

Jock Elliott, KB2GOM
lightkeeper@sprintmail.com

Cherokee's FR-465plusVW FRS Transceiver

Okay, I'll admit it: I'm a radio junkie. I love 'em. It's a pure joy to dive into all the packing materials and see what comes out. But I'm also a connoisseur . . . I particularly like radios that do everything *well*.

A case in point: the Cherokee FR-465plusVW. Regular readers of this column will remember that about a year ago, I tested the Cherokee FR-465 and found it to be an excellent Family Radio Service transceiver, offering superb range and a wealth of features that make it arguably the most sophisticated FRS rig on the market. The FR-465plusVW is an advanced version of the same radio, tricked out with a number of new features and capabilities.

The plusVW is less than 4" tall (excluding antenna), less than 2-1/2" wide and less than 1" thick. Except for its color, the plusVW looks identical to the standard FR-465. The pair I tested were bright yellow in color (white and blue are also available). There are seven buttons on the front plus a liquid crystal display that provides vital operating information. On the top, you'll find an on/off/volume knob, a port for plugging in a speaker-microphone and the antenna. On the left side, there is a push-to-talk button and a "function" button.

On the right side, there is only a port for plugging in a battery charger or optional cigarette lighter adapter. This radio comes standard with a rechargeable NiMH battery and wall wart-style charging unit, but it also comes with a tray that can hold five AAA alkaline batteries. On the back of this radio is a sturdy belt clip and a hatch for getting at the battery compartment, and on the bottom panel is a lock for the battery compartment and contacts for using this radio with one of Cherokee's excellent drop-in chargers.

Like any FRS unit, you can just switch on the plusVW and use it. All you have to do is select a channel and the auto-squelch function takes care of the noise. And, like many other FRS radios, you can set Continuous Tone Coded Squelch System (CTCSS) tones. Some manufacturers call these "privacy" codes, but that is really a misnomer. When you set CTCSS tones, all transmissions except those on the same channel and using the same tone are blocked. CTCSS is a way of making sure you only hear the transmissions intended for your group. The plusVW can set a CTCSS tone for one channel and not for another, can set different tones for different channels, and offers the ability to turn tones on or off for a particular channel with just a couple of button pokes.

Features Apart from the Crowd

A special note: the plusVW and other Cherokee radios offer 47 CTCSS tones. Most FRS units that have CTCSS tones offer only 38. This can create some confusion if you are trying to use tones with other FRS units. The chart below outlines the differences. Stick a photocopy of the chart in your wallet or keep a copy with your FRS radio. You never know when it will come in handy.

Like the FR-465, the plusVW allows dual watch monitoring of two different channels, and there are other scanning and memory features. But unique to the plusVW is highly water-resistant construction. While it's not designed to be totally immersed under water, a special gasket makes it able to handle heavy precipitation and splashing. That makes it a good design for folks — like Scout groups, backpackers, and bike trippers — who need to use their radios outside under adverse conditions.

A couple of other features make the plusVW particularly useful for outdoor adventurers or others who might find themselves in potentially risky situations. An automatic polling function (called Vitalink™) that works with a pair of plusVWs allows a master unit to send out a 1-second polling transmission. The "slave" unit receives the signal and automatically transmits a silent response if it is within range. If not, an out-of-range indication is displayed on the master unit with an alert tone.

In addition, the user of the slave unit can activate a "panic" button, which sounds an alarm tone at the master unit and displays HELP on the LCD. At the same time, the slave unit is automatically put into voice-operated transmission mode. Another neat feature is that this radio can be set to vibrate silently when someone is trying to reach you.

As with the FR-465, the performance of the FR-465plusVW is excellent on both transmit and receive. This radio gets my highest recommendation for anyone who wants a highly weatherproof FRS unit with a wealth of advanced features. Suggested retail prices is $199.95 including rechargeable battery and charger. For more information, contact Wireless Marketing, 1-800-259-0959, Monday-Friday, 8 AM-5 PM, Central Time or visit **www.wirelessmarketing.com**.

47 CTCSS TONE TABLE

Cherokee 47 Code No.	Freq (Hz)	38 Code Comp.	Cherokee 47 Code No.	Freq (Hz)	38 Code Comp.	Cherokee 47 Code No.	Freq (Hz)	38 Code Comp.
1	67.0	1	17	114.8	16	33	186.2	30
2	69.3	N/A	18	118.8	17	34	189.9	N/A
3	71.9	2	18	123.0	18	35	192.8	31
4	74.4	3	20	127.3	19	36	196.6	N/A
5	77.0	4	21	131.8	20	37	199.5	N/A
6	79.7	5	22	136.5	21	38	203.5	32
7	82.5	6	23	141.3	22	39	206.5	N/A
8	85.4	7	24	146.2	23	40	210.7	33
9	88.5	8	25	151.4	24	41	218.1	34
10	91.5	9	26	156.7	25	42	225.7	35
11	94.8	10	27	159.8	N/A	43	229.1	N/A
12	97.4	11	28	162.2	26	44	233.6	36
13	100.0	12	29	167.9	27	45	241.8	37
14	103.5	13	30	173.8	28	46	250.3	38
15	107.2	14	31	179.9	29	47	254.1	N/A
16	110.9	15	32	183.5	N/A	off	no tone	off

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Prospects for Software Radio and a Look at "SkySpy"

In 1970, if someone told you about a book-sized device that had more computing power than the latest room-filling IBM 360 mainframe, stored as much data and displayed color pictures and video, what would you have thought? Perhaps you would have considered them plain crazy or at least a crackpot. However, if they gave you a demonstration, it might have stunned you into believing that you were in the presence of an alien from a civilization thousands of years more advanced that ours. I know I would have.

Yet, less than thirty years later, we take notebook computers, which have all of these attributes, for granted as commonplace. In the past thirty years technological developments have moved at an unprecedented pace.

The miniaturization of low power active devices (transistors) on silicon, which started in the 1960s, enabled a higher number of devices to be put into a small volume space. Manufacturing developments then allowed whole circuits, not just simple devices, to be put on a tiny chip of silicon. Say hello to the integrated circuit.

More shrinking made it possible to construct many fast running circuits on the same, small silicon real estate. The hand-held calculator was born. These calculator chips begot four-bit, multi-capable (input, storage, data manipulation and display) chips. Witness the birth of the microprocessor. And the pace of shrinking has continued to accelerate since the 1980s.

Faster than a Speeding Electron

Device density (number of transistors per area) is not the only benefit of shrinking feature size. The speed at which the circuit can operate has also been dramatically affected. Today, data switching rates, which twenty years ago were difficult to generate in the radio oscillators, are available to the consumer. And now we have a combination of high integrated circuit complexity (millions of transistors on a chip) and very high data clock speeds (300 MHz+).

The result is high speed, complex, software controlled circuit elements. These circuits have the ability to exhibit different electrical characteristics, depending on their software program. With high computing speeds, the software configuring of these circuits is now so fast the electrical result appears as real-time. Poof! ... DSP, Digital signal processing.

So what about the software radio? Is it hardware? Umm ... yes. Is it software? Yes. So, exactly what is this new animal?

Reconfigurable Software Radio

Led by Softwave four years ago, a number of companies have produced computer controller receivers; some with DSP. Now, let's get a few terms straight. Computer controlled does not always equal DSP. The computer control refers to how the user interfaces and uses (tunes) the receiver. The DSP part refers to how the receiver circuits are taking the off-air signal and transforming it into speech.

A total DSP receiver would take the off-air signal and turn it into a stream of digital data. This data can then be manipulated in a digital form, and finally reconstituted as audio. Think of the difference between your old vinyl music records and CDs. The record used features on the walls of the groves which made a needle vibrate to reproduce the sound. The CD is digital and reads "1"s and "0"s of the digitized sound. The clarity and noise differences are obvious (but I still keep an LP collection as well as CDs).

Add to this the fact that low cost chips now enable the sender to "modulate" speech in a digital format (the new breed of cellular telephones), and all the elements for next generation radio are in place.

We can glimpse the future in some of the products that are now being introduced. Micrel Inc. has announced the MICF01 which is a single chip receiver/data demodulator. It's capable of operation between 300 and 450 MHz and includes all RF, IF and demodulation on chip — "antenna-in-through-data-out." Must be pricey, right? Wrong! It's $3 in 1000 piece quantities. Check out www.micrel.com for more information.

Even more advanced is Quicksilver Technology Inc. They are using adaptive computing and are designing a single controller which will be capable of being used by all cellphone handset manufacturers. It will automatically reconfigure itself, both in frequency range covered and digital "modulation" form (TDMA, CDMA and Global Systems), depending on which cellular network it is being used on. In order for this to be possible, DSP techniques have to be taken right to the antenna input!

One of their targeted customers requires a frequency range of 800 MHz to 2.1 GHz. This will take some pretty fancy technology, which is more than even today's DSP can provide. Throw away that soldering iron. Soon you won't need to tinker with that hardware to make operational modifications. Just re-program it.

Could this be the end of people writing endless boring articles on narrow, limited hardware modifications? Radio hardware hackers may soon be going the way of spark-gap engineers. The software radio may be closer than we realize. Hmm, I think that old alien from the 70s may be back.

SkySpy - The Latest ACARS Package

We have talked about ACARS — the digital transmissions which commercial airliners use for in-flight aircraft situational reporting — in this column over the years, reviewing decoders from AEA, Lowe and others. Now comes another ACARS software/hardware package from the United Kingdom. (Come to think of it, most ACARS programs seem to originate in the UK or Europe; I wonder why?)

SkySpy is the first ACARS program I have used which requires Windows 95 or 98. This is due to the very nice use of database windows which can simultaneously display near-real-time data. The SkySpy package includes a hardware decoder and two 3.5 inch, high density, floppies. The decoder is housed in a 25 pin serial port connector housing and requires no additional power. A cable with a mini-phone plug, which connects to the speaker/headphone jack of your aircraft radio, is the only connection required.

This decoder is quite versatile and can be used with other decoder programs such as HamComm, PC HF FAX, PKTMON12, POCSAG and DL4SAW's SSTV.

Loading of SkySpy version 1.5 was quick and simple. On the initial running of the program the Key and Serial number (provided on the disk) is required as a form of copy protection.

We'll use a Pentium 233MMX, with 64M

RAM and a Tandy Pro-2004 attached to a simple discone antenna with SkySpy. A 9 pin to 25 Pin Converter (not supplied) is required for my computer to interface with the decoder.

With the audio cable plugged into the headphone jack of the Pro-2004 and the volume set to halfway, the Lists screen of SkySpy jumps to life with activity. See Figure 1. A box lights green on the tool bar when the program is "hearing" the receiver. In order to capture ACARS the squelch must be turned off. The resulting white noise illuminates the box. It doesn't indicate a signal, but it is useful in checking that everything is connected to SkySpy, and it is "listening."

The Lists screen is one of five basic screens: **Lists** displays all the decoded information on a single line; **Monitor** displays all the raw data stream decoded by the program and any receive errors; **Flight** provides flight numbers of aircraft received and the first and last date of intercept; **Registration** is an alphabetical listing of received aircraft tail numbers and first and last date of intercept,;and finally, the **Message** window breaks the single line data of the List screen into easily read information.

We'll look at the functions of the Lists screen and the Message window, since the rest are self-explanatory. A nice help feature, which is activated by clicking on the help title, is very useful in explaining functionality and screen usage.

Lists Screen – Enjoy Your Flight

This is my favorite screen, since all real time data is decoded and displayed right here. The screen is eleven columns, each of which can be expanded or collapsed, depending on your personal interests. The first column shows intercept date/time information. (More about Time settings later.) The last column shows a number which indicates the chronological order of reception. The decoded data,

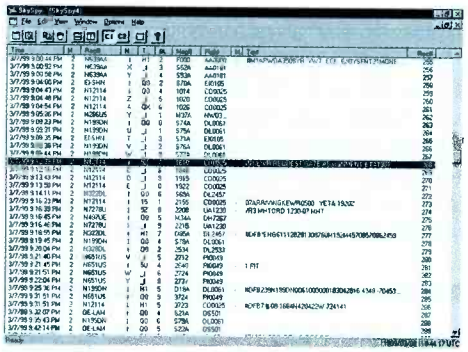


FIGURE 1 – *SkySpy Lists Screen Where It All Happens*

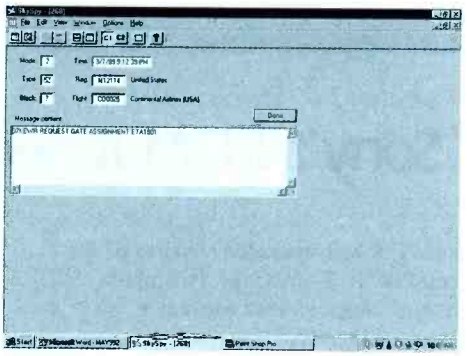


FIGURE 2 – *Message Window: A Plain Language Screen*

such as flight number, aircraft registration, mode and acknowledgment is the sandwich meat of the screen.

A very convenient feature of SkySpy is the way this screen data can be sorted, or ordered, by any one of the columns. Figure 1 was sorted by time of intercept, the program's default. But if we want to see an intercept list sorted on aircraft registration, all we need do is to click on that heading (Reg #) and the program does the rest. A double click sorts in the reverse order. Very user friendly!

The ABCs of Reading ACARS

Now, suppose you are as lazy as I am, and have better things to fill your brain with than ACARS decoding formats. The writers of SkySpy have helped out a bit by including the Message Window screen. If we click on an intercept line from the Lists screen, the Message Windows opens up and explains some of the data. See Figure 2 (the message says "07KEWR REQUEST GATE ASSIGNMENT ETA1901.")

Hey, let's get a gate for this guy! Unfortunately, the message content window does not perform any further deciphering of ACARS formats. So you're on your own from here.

Tops Down View of SkySpy

SkySpy is a very user friendly ACARS program which takes advantage of the features of Windows 95/98. The one problem I did have was setting the time of the program to reflect my actual local (or UTC) time. The time displayed was not the actual time of intercept. Perhaps the program requires me to set my computer's time to UTC. That's *not* going to happen. I found nothing concerning time setting in the instructions or their Website. I've e-mailed SkySpy my time setting question.

With SkySpy's extensive database features and operations, operator-less monitoring works very well. I suggest you let SkySpy monitor all day while you are at work (or out shopping with your better half). You may see some interesting message patterns develop. I think you'll be surprised at all the activity on the commercial airways.

SkySpy, version 1.5, is available from Pervisell Ltd, 8 Temple End, High Wycombe, Bucks, UK HP13 5DR for 24.99 pounds sterling. The basic hardware decoder is available for 16.99 pounds sterling. Call them at 01494 443033, or email them for shipping costs. Their Website, which contains some very nice free downloadable radio programs, is www.pervisell.com and email is *ham@pervisell.com*.

Other aircraft database products can be used with SkySpy. If we are able to obtain them we'll bring you their details in a future column. My thanks to Dick Milligan for bring SkySpy to our attention. Till next time, remember what our aircraft monitoring brethren already know ... keep looking up.

Lawrence Magne
Editor-in-Chief, Passport to World Band Radio

The New ICF-SW07: Sony's ROM-Tuned Clamshell Portable

Mention "shortwave" to a powwow of broadcasting chiefs, and you can expect a collective sigh. "It's too unreliable," they'll say. Not to mention that it sounds poor and listeners can't keep track of schedules.

Sony founder Akio Morita had a personal as well as financial interest in shortwave. About 15 years before he retired, he began putting Sony on the path to producing the best-engineered world band portables in the world. Early efforts included the classic ICF-5900W and ICF-6800W, but the pattern was really set with the pioneering ICF-2001 with true digitally synthesized tuning. The '2001 had its share of problems, which were remedied in the similar ICF-2010 that incorporated a wealth of benchmark improvements, including synchronous selectable sideband. To this day, the '2010, which was then way ahead of its time, continues to be the best world band portable on the market, according to the 1999 *Passport to World Band Radio*.

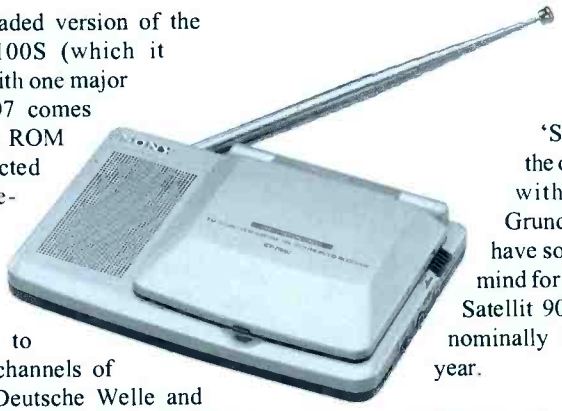
But the '2010 is about half the size of a laptop, so bit by bit Sony began introducing high-tech models which were handier for traveling. The high water point for this came with the ICF-SW100S/E, about the size of an audio cassette's jewel box.

All these advanced technology models performed well enough to diminish the criticisms that shortwave is unreliable and poor-sounding. The keys to Sony's success lay in their radios' good sensitivity to weak signals, decent bandwidth filtering, and especially the world's first properly performing synchronous selectable sideband circuitry for portables. To this day, no other portable manufacturer has been able to match Sony's technology in sync performance.

All this says something about Sony's corporate culture. Competitor Matsushita declared some years back that its family of companies, including Panasonic, should not make major efforts in areas of mature technology. Sony, however, decided to use advanced technology to bring new life into mature markets, including world band radio, and the benefits of this decision keep rolling in.

Replaceable ROM tuning factory-set for four stations

With that in mind, this April Sony introduced the new ICF-SW07 compact portable, roughly $420 on the street. In a nutshell, it is an enlarged and upgraded version of the smaller ICF-SW100S (which it doesn't replace), with one major change: the 'SW07 comes with a replaceable ROM which stores selected world band frequency information. With this new feature, you can use four dedicated buttons to scan for suitable channels of the BBC, VOA, Deutsche Welle and one other major station (RFI, Radio Nederland, Radio Japan, Radio Exterior de España or China Radio International, as you prefer). There is also a similarly performing fifth button you can self-program from printed and other independent schedule sources. None of the station information is tied into the time of day, however.



In principle, this feature should help cope with the criticism that world band radio schedules are too arcane and fluid for most folks. How it will pan out in practice remains to be seen.

Here's how it works. There are five buttons, labeled MY, DW, VOA, BBC and OTH. (No, "MY" isn't for Myanmar, but rather for whatever station's frequencies you have entered manually; "OTH" is for whichever of the "other" stations on the ROM, see above, you have chosen.) Double-press the dedicated button for the station you want and, working from the lowest stored frequency upward, the radio's ROM scanner stops at the first occupied channel, displaying the station's name. Of course, you have to use your ears to ascertain whether the station you're hearing is actually the one you want, as frequency sharing is commonplace on world band.

If you don't like the result, press the button again and the radio continues scanning upward. Schedule data for all but the MY button is stored on the ROM, which can be replaced (for $20) from the F Corporation in Japan, which has a longstanding working relationship with Sony; access is via a slider on the back of the set.

Unfortunately, the ROM setup's stored frequencies are not tied into the times when they are scheduled to be used by the broadcaster you're trying to hear. This means you may have to wade through 15 or so frequencies, often occupied by other broadcasters at that given hour, to find one usable channel.

Although the 'SW07 is currently the only radio available with this feature, Grundig is rumored to have something similar in mind for its long-postponed Satellit 900, a larger model nominally due out later this year.

Global time clock regulates tuning characteristics

The 'SW07 also has a global time clock which can display either local time or UTC, as you choose. However, unlike with the '2010 the time display is shared with the frequency display, so you can see one or the other, but not both at the same time. Local time corresponds to a world time zone which you select, and in turn that time zone determines whether the slew increment for the AM band is to be 9 kHz or 10 kHz. Oddly, the radio defines the AM ("MW") band as stopping at 1620 kHz, so above that its coarse slewing shifts from 9/10 kHz increments to 5 kHz increments; better would have been to have had the AM band to 1602 kHz for 9 kHz channel spacing, 1700 kHz for 10 kHz channel spacing.

This world time zone concept is also important for the ROM-frequencies feature, as the only frequencies selected are these which are nominally beamed to those parts of the world within that time zone. That's fine for the evening, when much is beamed your way. But at other times, you can get "off-beam" reception by traditional tuning or by fooling the radio's "smart" circuitry by selecting another time zone for your receiving location. Thus, for example, if you wish to try to hear the BBC's European channels while listening from Eastern North America, you shift the clock's setting for your local time zone from UTC -5 to UTC +1, thus fooling the radio into "thinking" you are listening from a European location.

Small, with handy clamshell design

The radio is truly lightweight, weighing only 10 ounces, including two AA batteries. It measures 5-5/16 by 3-5/8 by 1-1/4 inches, and the top two-thirds of the case is covered by a

laptop-type clamshell containing the liquid crystal display (LCD). It comes standard with a worldwide ac adaptor and an AN-LP2 outboard active antenna.

Early versions of the ICF-SW100S and ICF-SW100E suffered from failures of the cable connecting the upper and lower halves of the clamshell. Sony learned its lesson and redesigned later production units of the 'SW100, so it is unlikely the 'SW07 will have a problem in this regard.

Numerous features, including selectable synchronous sideband

The 'SW07 covers the Japanese and regular FM bands from 76-108 MHz. Longwave, mediumwave AM and shortwave is tuned continuously from 150-29999 kHz in 1 kHz increments above 1630 kHz, plus single sideband tunes in 0.1 kHz increments below 30 MHz. However, unlike the '2010, whose frequency readout is nominally to the nearest 0.1 kHz, that of the 'SW07 is only to the nearest whole kHz.

There is no tuning knob, but there are two levels of frequency slewing (typically 5 kHz and 1 kHz increments), an alphanumeric keypad, ten conventional FM presets plus ten more for longwave/AM/shortwave, frequency "signal-seek" scanning, and scanning of the selected station frequencies stored in the ROM. The ROM scanning function works as it should, although the frequency scan tends to stop only at powerful signals, and even then sometimes stops one channel (5 kHz) shy of the intended signal.

Other features include a single but effective bandwidth and synchronous selectable sideband, which together pretty much keep adjacent-frequency interference at bay. There's helpful auto-fade illumination for the LCD, but the simple "yea-nay" signal-strength indicator is virtually useless, especially when compared against the '2010's ten-LED indicator. A thoughtful touch is that the battery cover is hinged onto the cabinet so it can't fall off.

Although there is no elevation panel, the set is designed to tilt upward slightly when laid down, and the clamshell top can be set to nearly any angle for optimum viewing. There is a weak-battery indicator which unfortunately can activate, misleadingly, immediately after new batteries are put in, or right after existing good batteries are removed and reinserted; turning the radio on shuts off the erroneous indication. There are two programmable alarm times you can set, along with a 60-minute sleep delay function.

Performance, except audio, unbeatable for size

I tested an early-production sample for several weeks in locations with a wide variety of signal qualities, ranging from urban New York City to suburban Pennsylvania to the French Antilles to the northern vicinity of South America. Based on the results of this pleasant exercise, performance appears to be excellent by even the most demanding of portable standards; audio aside, it is just a skootch below that of the very best larger models.

FM reception is simply fantastic — superb sensitivity to weak signals, as well as top-notch capture radio to help sort out co-channel interference by reorienting the antenna. AM-band reception, although not quite equal to that of the larger ICF-2010, has worthy sensitivity and superior selectivity that's aided by synchronous selectable sideband, which also kills selective-fading distortion that bothers some AM stations around twilight. (Note that the accessory 'LP2 antenna has to be disconnected for proper AM-band reception.)

World band reception is surprisingly good, especially when the AN-LP2 outboard antenna is used — on this radio, that outboard antenna makes a real difference! By the way, the 'LP2 is the exact same critter as the AN-LP1 reviewed in the 1999 *Passport to World Band Radio*, except that because it was made to mate with the 'SW07 bandswitching is done automatically and electronically, instead of by hand.

With the 'LP2, the 'SW07 is actually more sensitive to weak signals in some parts of the shortwave spectrum than is the top-rated ICF-2010 "bareback." Although the '2010 paired with an AN-LP1 — a fairer match, to be sure — more than evens the score, this is an indication of just how well this little radio can perform. Adjacent-channel rejection is nearly tops for a portable, although the sync doesn't hold lock quite so consistently as it does on the '2010. Except on FM below 87 MHz, spurious signals are rare throughout the tuned spectrum.

Single-sideband reception is stable and generally good, but like many other portables suffers from a lack of tuning in less-than-100 Hz increments. It's a pity that a radio in this price class couldn't include an auto-turnoff +/-80 Hz analog fine-tuning clarifier to get reception spot-on between 100 Hz increments, especially with such stations as WGTG and the will-o'-the-wisp AFRTS now being audible only via single-sideband transmissions.

Since the demise of the ICF-6800W in 1987, Sony's world band radios have offered precious little in the way of audio quality. The 'SW07 is no exception. Its audio leaves much to be desired, thanks to a tiny speaker and measly "news-music" treble-cut tone switch. But even with headphones, the lack of a wide bandwidth greatly limits the opportunity to hear at least some AM or world band stations with genuine fidelity. The second bandwidth found on the '2010 and the ICF-SW77 is a major plus, especially with the sync in use, and it is sorely missed on the 'SW07, which after all sells for $70 more than the grandmaster '2010.

Pricey, but hard to beat

Is this new radio worth it? After all, for sheer value it's hard to ignore Sony's similarly sized ICF-SW7600G at less than half the price of the 'SW07, and for smallness the itsy ICF-SW100S gets the Kewpie doll — both have the same synchronous selectable sideband circuit as the 'SW07. Neither these nor the 'SW07 fully equals the larger ICF-2010 for sheer performance or audio quality. Yet, except for audio quality, the new ICF-SW07 is the ultimate radio for the road warrior who doesn't want to go second class. And it's got pizzaz and performance aplenty to endear it to PC cognoscenti who can't plug in for a Web radio fix.

The Sony ICF-SW07, although pricey, is a top-notch entry among compact portables. If you're a serious radio enthusiast who can't find space in your carry-on for a '2010, you'll be hard pressed to come up with a travel-sized radio to equal the 'SW07 in performance.

This equipment review is performed independently by Lawrence Magne and his colleagues in accordance with the policies and procedures of International Broadcasting Services, Ltd. It is completely independent of the policies and procedures of Grove Enterprises, Inc., its advertisers and affiliated organizations.

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Remote Scanner Monitoring

It's nice to have a spouse who supports my hobbies. My wife often brings home interesting electronics parts and gadgets she finds at flea markets and garage sales. A few years ago, she brought home three steel boxes, each being about the size of a microwave oven and filled with several 117 VAC electromechanical relays in plug-in sockets. The boxes appeared to be industrial controllers used for factory process control.

What could I do with a pile of relays in a steel box? I used them to build a controller so I could listen to my home scanner remotely via telephone. My home was already equipped with a second telephone line which I used primarily for making outgoing calls. This controller connected the phone line to the speaker leads of an old Electra Bearcat BC-300.

Whenever someone would call my home on this phone line, the controller seized the line, started an internal timer, and fed the audio output of the BC-300 out onto the phone line. The caller could hear whatever the BC-300 heard. After a few minutes, the controller would hang up the phone line and rearm itself.

FIG 1

A handful of salvaged Potter & Brumfield plug-in relays were used to make a remote scanner controller.

How it Works

As shown in the schematic, when a telephone call is received, the ac ringing voltage on the phone line passes through the 4 µF capacitor and energizes relay RL1. RL1 momentarily energizes RL2, RL3, and time delay relay RL4. RL3 is wired as a latch and its contacts apply 117 Vac to its coil so it stays energized and keeps RL2 energized.

RL2 connects the scanner audio through an impedance matching transformer to the telephone line. A 600 ohm resistor placed across the phone line makes it appear to the central office that someone has picked up a telephone, i.e., it is "off hook."

Any audio present on the scanner's speaker leads is transmitted down the telephone line, so the caller can listen to the scanner from miles away. The varistor clamps any high voltage spikes which may be present on the phone line so they won't damage the scanner.

A few minutes later, time delay relay RL4 "times out," opening its contacts and disconnecting ac power from the other relays. The turn-on delay in the stock RL4 was controlled by an internal capacitor and an external resistor. Its 0.1 - 10 second delay was too short, so I swapped the internal capacitor with one of a larger value. For the timing resistor, I used a rheostat mounted through a hole in the cabinet so I could adjust the length of the timeout.

Switch S1 is the main power switch used to arm the controller. Push-to-test switch S2 lets me connect the scanner to the phone line without an incoming call.

I used Potter & Brumfield KRP11AM for relays RL1, RL2, and RL3 and a Potter & Brumfield CLF-41-70010 for RL4. They are expensive DPDT (double pole double throw) plug-in relays, but the "price was right." I won't provide step-by-step construction details, but you can study the schematic and substitute less expensive relays from Radio Shack or another source. The abbreviation NC means "normally closed" and NO means "normally open" contacts.

There are more modern ways to perform the same task, like using an answering machine equipped with a room monitor feature. Older style electromechanical relays have been replaced by solid state devices in many applications. But, relays are less apt to be damaged or falsely triggered by nearby lightning storms, and my controller has worked reliably for years.

Longer MX-4000 / MX-4200 Battery Life

The old Regency MX-4000 and MX-4200 are battery-operated, 20-channel scanners manufactured in Japan by AOR. Both scanners contain a low battery warning circuit which disables the scanner when the battery voltage falls below a preset level.

A freshly charged battery pack should last at least 5 hours before needing a recharge. Ron Smithberg, of Joliet, Illinois, complained of getting only 2 hours use from a set of freshly charged NiCd batteries in his MX-4200. This note describes how we increased his usage to over 7 hours between charges.

Both MX models are powered by a pack of four AA-sized NiCd batteries. The battery pack is nominally 4.8 volts and has a rated capacity of about 500 mAH. The scanner draws about 100 mA when squelched. A good rule of thumb is that a NiCd should be recharged when its voltage falls below 1.0 volts per cell. Using this heuristic, the MX-4200 battery pack should be recharged when it falls

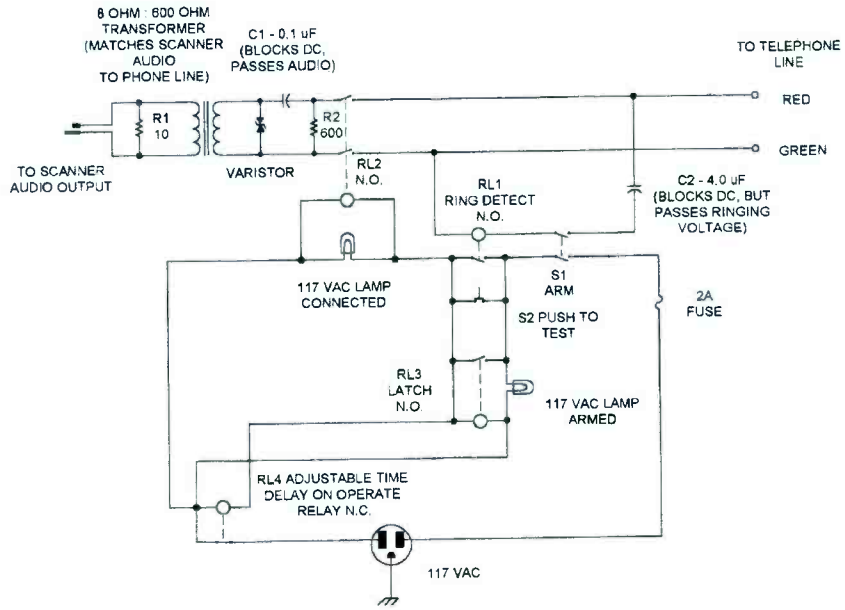

FIG 2 - *Controller answers calls on telephone line and connects scanner audio to line. Relay RL4 disconnects scanner and hangs up after a few minutes.*

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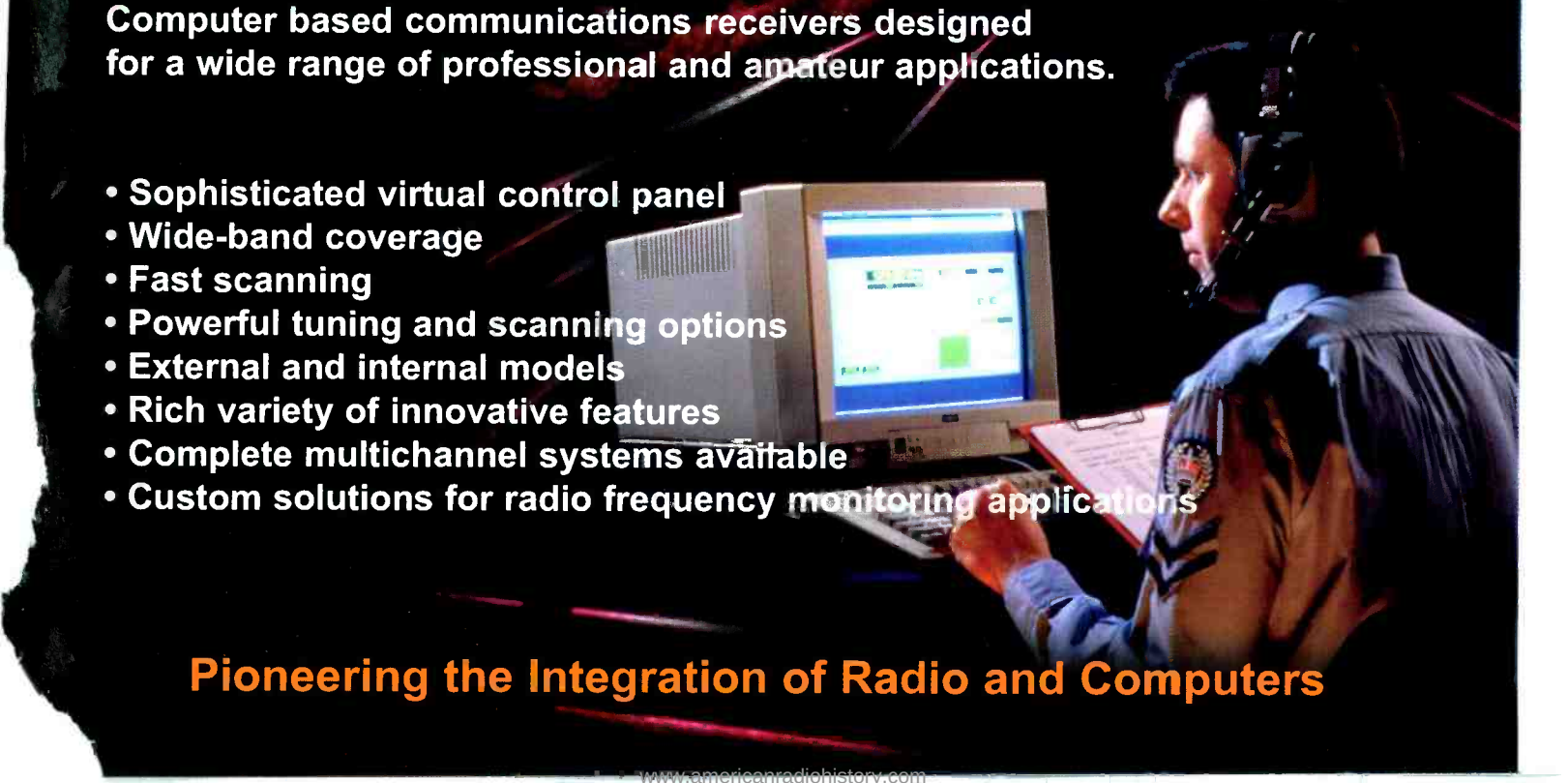

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WiNRADiO®

COMMUNICATIONS

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The award-winning and immensely popular WiNRADiO WR-1000i is the world's first commercially available PC-based wide-band communications receiver. Integrating advanced radio receiver technology and the computing power of a PC, it sets a new standard in radio communications.

The synergy of radio and computing technology provides all WiNRADiO receivers with many unique features which are hard to find on conventional communications receivers. These include a rich variety of tuning and scanning options, versatile memory and database facilities, and innovative user interfaces designed for flexibility and ease of use.

WiNRADiO 1000/1500 series

The 1000/1500 series products offer cost-effective solutions for a wide variety of applications. The products come in two forms: internal ISA-bus cards, and compact external units with an RS-232 interface (PCMCIA interface optional).

Internal model (WR-1500i)

The advantages of an internal card model are in its neatness – there are no external cables required, no external interface ports are occupied, no external power supplies or extra desk space are needed. And if you wish, nobody needs to know that you have a scanning receiver hidden inside your PC!

Multichannel operation is simple to achieve, as up to eight WiNRADiO internal receivers can be used simultaneously in one PC.

External model (WR-1500e)

(Computer not included)

The advantage of an external model is in its portability – the optional PC card interface (PCMCIA) allows very fast and simple installation for any portable PC. Serial RS-232 interface is also available as standard.

The external models also feature a discriminator output.

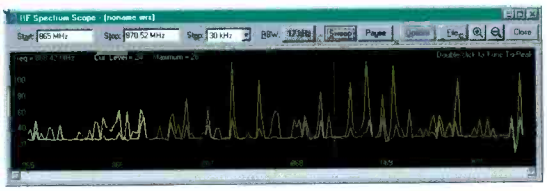
Both models are very well shielded from PC interference. We use specially developed shielding materials and innovative design methods to prevent any interference directly entering the receiver.

WiNRADiO Software

The 1000/1500 Series software works on Windows 3.11, 95, 98 and NT. Impressive high-resolution graphics combine with a variety of useful features, all logically and intuitively laid out.

The WiNRADiO software sets new standards for computer-controlled radio receiver interfacing. Its features include automatic mode and step size selection, duplex separation, user-definable frequency offset, a rich variety of scanning modes including multiple-range scanning, virtually unlimited number of memories, and many other powerful features.

The Spectrum Scope facility displays real time activity on the bands. It is complemented by our graphic tuning facility called Visitune™ (patent pending). This facility allows you to tune the receiver continuously, using the mouse, across the frequency spectrum visible in the background.



Click on a peak and you are instantly tuned. Alternatively, keep the left button down and drag your mouse across a scanned spectrum – you will see the frequency cursor moving, the frequency display updating accordingly and the receiver will be tuned following your hand movements!

Optional Portable Power Source

Many external radio receivers neglect user convenience with respect to the availability of a suitable portable power supply. WiNRADiO provides a suitable external power source, to meet the most demanding standards.

The WiNRADiO Portable Power Source is based on high-capacity, long-life nickel-metal-hydride rechargeable batteries, coupled with intelligent, fast-charging circuitry which saves the battery life and guarantees maximum charging capacity. (Suitable for external models WR-1000e, WR-1500e and WR-3100e).

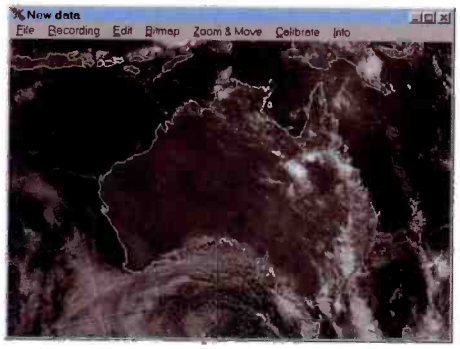
Optional PC Card Interface

The PC Card interface (PCMCIA Type II) makes connecting a WiNRADiO receiver to a laptop or a notebook computer especially easy. The Plug-n-Play facility automatically registers the card, and the installation is very simple indeed. (Suitable for external models WR-1000e, WR-1500e and WR-3100e).

The PC Card Interface comes with a cable to suit

Optional Digital Suite Software

The optional WiNRADiO Digital Suite is a collection of digital signal processing modules. Together, they represent a breakthrough in reception of digitally coded radio communications - never before has such a comprehensive collection been made available at such low cost and so elegantly integrated with a PC-based radio receiver.

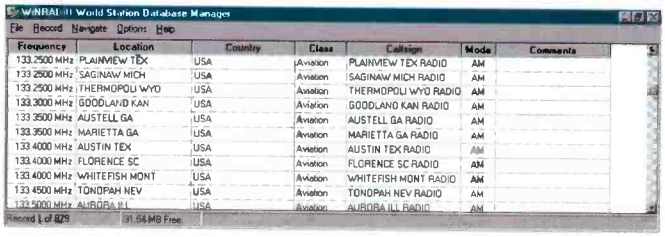


The WiNRADiO Digital Suite expands the power of a WiNRADiO receiver with numerous digital processing facilities, including:

- WEFAX (Satellite Weather Fax)
- HF Fax
- Packet Radio
- Aircraft Addressing and Reporting System (ACARS)
- Digital Tone Multi-Frequency Signalling (DTMF)
- Continuous Tone Coded Squelch System (CTCSS)
- Signal Classifier
- Audio Oscilloscope and Spectrum Analyzer
- Squelch-controlled Audio Recorder and Playback

Optional Frequency Database Manager Software

The optional World Station Database Manager greatly simplifies the maintenance of frequency databases. It is fully integrated with the receiver software, and allows for instantaneous tuning to stations while browsing or searching within a database. Similarly, an unknown frequency can be readily indentified by invoking the Database Manager.



The user can add, delete or edit database records as well as import data from other databases. The software comes with a ready to use database of over 300,000 stations world-wide.

WiNRADiO 3100 series

Designed for goverment, military, security, surveillance and industrial applications, the WiNRADiO 3100 series puts advanced radio receiver technology directly on a personal computer platform to create a complete spectrum surveillance and monitoring system.

WR-3100i-DSP internal receiver

The WiNRADiO 3100 series receivers come in two forms: internal ISA-bus cards, and compact external units with an RS-232 interface (PCMCIA interface is optional). A dedicated Digital Signal Processor (available on the internal model only), is used for real-time audio recording and playback. Recording can be controlled manually or automatically using time presets or signal level thresholds.

WiNRADiO 3100 series receivers feature a practically unlimited number of memories, sophisticated search facilities, group allocations, automatic memory writing, exclusion list, frequency logging and much more. The in-built Task Manager makes it possible to program the receiver to perform many tasks automatically, and make decisions based on user-specified conditions. Up to eight independently operating receivers can be controlled by a single PC. The WiNRADiO 3100 series receivers represent an ideal solution for high-performance automatic monitoring systems.

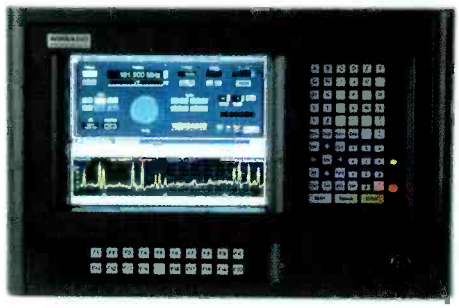
Complete Multichannel Systems

Until recently, the task of multichannel radio frequency surveillance and monitoring involved a number of separate radio receivers, audio recorders and other discrete components interconnected into bulky and expensive systems.

WiNRADiO Multichannel Systems provide an elegant, fully integrated solution, specifically designed for computer-controlled automatic monitoring of frequencies ranging from below the AM broadcast band up to low microwave, in all major modulation modes.

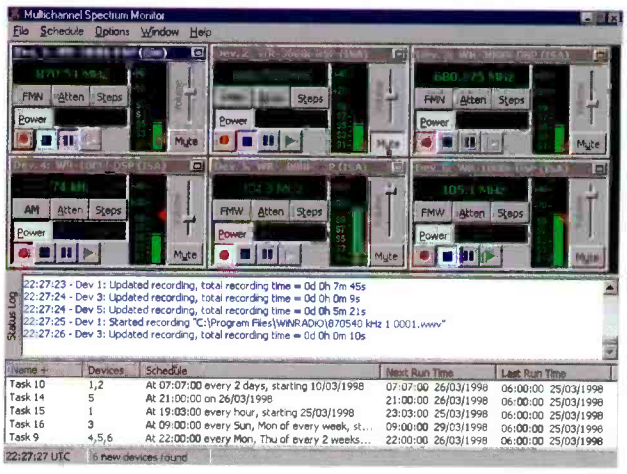
Available in several configurations to suit specific requirements for radio frequency monitoring, the systems are designed to monitor radio frequencies on multiple channels simultaneously, record digitized signals on the hard disk for easy later retrieval, and perform automatic decisions based on received signals.

WiNRADiO Multichannel Systems can be operated either manually or autonomously in unmanned remote locations. Remote operation and networking facilities are also available.



MS-8006 (six channel) Surveillance System

User-selectable audio compression methods make it possible to store weeks or months of continuous, simultaneous recording of all channels on the in-built hard disk.



WiNRADiO Multichannel Monitoring System software allows the user to observe the status of all received channels on a single screen using virtual "micropanels" for each channel, each one of them fully expandable to a full size panel .

Each expanded control panel allows for indepedent operation of a high-performance scanning receiver with sophisticated functions such as automatic task scheduler, spectrum scope, DSP signal conditioner, signal strength recorder, programmable audio recorder, and many other features.

Specifications

Model Numbers	WR-1000i/WR-1000e	WR-1500i/WR-1500e	WR-3100i-DSP/WR-3100e
Type	Triple superheterodyne	Triple superheterodyne	Triple superheterodyne
Frequency range	0.5-1300MHz*	0.15-1500MHz*	0.15-1500MHz*
Modes	AM,FM-N, FM-W, SSB/CW	AM,FM-N,FM-W,USB, LSB, CW	AM,FM-N,FM-W,USB, LSB, CW
Tuning steps	100Hz (5Hz BFO)	100 Hz (1Hz USB/LSB/CW)	100 Hz (1Hz USB/LSB/CW)
IF shift	-	+/- 2kHz	+/- 2kHz
Audio output	200mW into 8 ohm load	200mW into 8 ohm load	200mW into 8 ohm load
Antenna connection	50 ohm BNC	50 ohm BNC	50 ohm BNC
Dynamic range	65 dB	65 dB	85 dB
Selectivity			
SSB,CW	6kHz/-6dB	2.5 kHz/ -6dB	2.5kHz/-6dB
AM	6kHz/-6dB	6 kHz/ -6dB	6 kHz/-6dB
FM-N	17kHz/-6dB	17kHz/-6dB	17 kHz/-6dB
FM-W	230kHz/-6dB	230kHz/-6dB	230 kHz/-6dB

** In some countries, certain frequencies may be omitted to comply with local government regulations.*

Typical Sensitivity for WR-1000i/WR-1000e receivers

Frequency Range	AM	CW/SSB	FM-N	FM-W
0.5 - 1.5MHz	5.0µV	2.5µV	1.0µV	-
1.5MHz - 30MHz	1.0µV	0.5µV	0.5µV	-
30 - 1000MHz	1.5µV	0.7µV	0.5µV	2.0µV
1.0 - 1.3GHz	5.0µV	2.5µV	2.0µV	4.0µV

Typical Sensitivity for WR-1500i/WR-1500e receivers

Frequency Range	AM (1)	CW/SSB	FM-N (2)	FM-W (2)
0.15 - 0.5MHz	(3)	(3)	(3)	-
0.5 - 1.8MHz	5.0µV	0.9µV	1.0µV	-
1.8 - 30MHz	1.0µV	0.3µV	0.5µV	-
30 - 1000MHz	1.5µV	0.3µV	0.35µV	1.8µV
1.0 - 1.5GHz	1.9µV	0.35µV	0.4µV	3.5µV

Typical Sensitivity for WR-3100i-DSP/WR-3100e receivers

Frequency Range	AM (1)	CW/SSB (1)	FM-N (2)	FM-W (2)
0.15 - 0.499MHz	(3)	(3)	(3)	-
0.5 - 1.7999MHz	5.0µV	0.9µV	0.9µV	-
1.8 - 29.9999MHz	1.0µV	0.3µV	0.35µV	-
30 - 999.9999MHz	1.0µV	0.3µV	0.35µV	1.0µV
1.0 - 1.5GHz	1.5µV	0.35µV	0.4µV	2.0µV

(1) For 10dB S+N/N *(2) For 12dB SINAD* *(3) Not specified*

	WR-1000i/WR-1500i/WR-3100i	WR-1000e/WR-1500e/WR-3100e
Power supply	internal (PC supplied)	12V DC +/- 15%
Dimensions	114x290x18mm (4.5x11.4x0.7in)	122x216x48mm (4.8x8.5x1.8in)
In-built speaker	-	8 ohm 0.1W

Ordering codes

• WR-1000i	WiNRADiO WR-1000i receiver (internal)
• WR-1000e	WiNRADiO WR-1000e receiver (external)
• WR-1500i	WiNRADiO WR-1500i receiver (internal)
• WR-1500e	WiNRADiO WR-1500e receiver (external)
• WR-3100i-DSP	WiNRADiO WR-3100i-DSP (internal)
• WR-3100e	WiNRADiO WR-3100e (external)
• WR-DBM	WiNRADiO Database Manager Option
• WR-DS	WiNRADiO Digital Suite Option
• WR-PCA	WiNRADiO PC Card Adaptor Option
• WR-PPS	WiNRADiO Portable Power Source
• MS-8003	Multichannel Monitoring System (3 channel)
• MS-8006	Multichannel Monitoring System (6 channel)

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below 4.0 volts under load.

The low battery circuit on Ron's MX-4200 was misadjusted to shut down the scanner prematurely when the battery voltage fell below 4.7 volts. I readjusted the low battery threshold to 4.0 volts.

You can use the same procedure, but you will need an adjustable, regulated DC power supply, capable of furnishing between 3 and 5 volts at 500 mA or more, and accurate means of measuring voltage from the power supply. A digital voltmeter with an accuracy of 5 percent or better is best. You will also need a #1 Phillips screwdriver and a small, slotted screwdriver or alignment tool.

The low battery sensor threshold is controlled by a potentiometer. Here's how to readjust the sensor to 4.0 volts:

1. Turn the scanner off.
2. Connect a digital voltmeter to a well-regulated DC power supply and adjust the supply to 5.0 volts.
3. Connect the power supply to the snap terminals on the scanner that would normally connect to the battery pack. Be sure to observe proper polarity. Connect the positive lead of the supply to the female snap, and the negative lead to the male snap.
4. Turn the scanner on.
5. As you watch the scanner's LCD display, gradually reduce the power supply voltage until the scanner's low voltage warning begins to flash.
6. Read the digital voltmeter. If it reads between 3.9 and 4.0 volts, no further adjustment is required, just disconnect the supply and reconnect the battery pack.
7. Otherwise, turn off and disconnect the power supply, and continue.
8. Turn the scanner upside down, and place it on a soft cloth so as not to scratch the case.
9. Remove the bottom tilt foot from the scanner.
10. Remove the battery pack.
11. Remove the four Phillips screws holding the case bottom, then remove the case bottom.
12. Reconnect the power supply to the scanner and set it to 4.0 volts.
13. Turn the scanner on.
14. Locate a small gray potentiometer on the printed circuit board. The potentiometer looks something like a gray plastic Phillips screw head. If the scanner front panel is facing you, the pot will be just behind the keyboard on the left side. (Don't confuse this pot with the three pots along the right edge of the board. The battery voltage sensor pot is not near any other pot.)
15. Slowly adjust the potentiometer to the threshold at which the low battery indicator begins to flash.

This procedure worked with great success on an MX-4200, and its battery life was increased from 2 to 7.5 hours. Thanks to Rick Meyer, WB9UFL, for finding the potentiometer in his MX-4000, and Ron Smithberg for letting me experiment with his MX-4200.

PRO-7A Repair

The Radio Shack PRO-7A is a 1970's vintage VHF-high band, eight-channel crystal model. A PRO-7A owner wrote that his scanner no longer worked on channels 5 to 8 and the lamps for those channels would not light.

The PRO-7A uses one 7408A (IC6) and two 7400A integrated circuits (IC4, IC5) to switch among the 8 channels. His scanner is now scanning all channels after replacing one of the 7400A ICs.

ASK BOB

ANSWERS TO YOUR RADIO QUESTIONS

Bob Grove, W8JHD
bgrove@grove-ent.com

Q. *If my AC wall adaptor is plugged into the wall, but not operating an appliance, is it drawing any current? Do I need to remove it? (Yukon Cornelius, E-mail)*

A. An AC adaptor is a transformer, so its primary winding can be thought of as a resistor connected across the AC line; as such, it draws current whether or not it is operating an accessory. The small amount of power drawn by one of these little power cubes is probably not even measured by your residential power meter.

While it is possible for any electrical product to be defective, under normal circumstances you don't need to remove a wall cube unless it is getting hot (warm is okay).

Bob's Tip of the Month

An Even Better Reel Antenna

After reading our previous hint on building a simple reel antenna for casual shortwave reception, Duke Hickey wrote to suggest one he's been using which, coincidentally, I had actually seen manufactured commercially (or military surplus) several years ago.

Duke soldered the center pin of a standard SO-239 connector (to fit a PL-259 on the end of a run of coax) to the pull-tab of a 100-foot metal tape measure. This allows him to pull out as much antenna he needs for portable reception. Great idea! Duke is using this with his AOR AR7030+ receiver with excellent results.

I would suspect that shorter (50 or even 25 foot), spring-loaded tapes would work equally well, and you wouldn't even have to crank it in!

Q. *In scanner reviews, I've often noticed your magazine has a graph of the scanner's actual sensitivity. How can I measure sensitivity (other than listening to distant repeaters) in order to compare my radios to their published specifications? (Hurst Matthew, E-mail)*

A. Absolute sensitivity can only be measured by instruments, generally a calibrated signal generator and a voltmeter. You can make comparative checks, however, by simply switching between a scanner of known sensitivity, and the unit under test. As you would suspect, this would have to be done with very weak signals so you can hear background hiss; the less hiss and more intelligible the sound, the better the sensitivity.

As a rule of thumb, if you can hear the tiniest difference between the two signals, this is equivalent to 1 or 2 dB (decibels). If the difference is close, but undeniable, it is probably 5-10 dB.

Signal strength meters, when perfectly calibrated, indicate a 50 microvolt (very strong) signal as S9. There are 6 dB between S units. As you can see, it is impossible to establish a meaningful graph or scale on sound alone; instrumentation is necessary.

Q. *Can an antenna switch be used "backwards" so that one antenna could be sent to any of three radios? (Mike Elcsisin, Philadelphia, NY)*

A. Absolutely; there is nothing directional about a mechanical switch; it merely provides a path for the signal. Whether that path is from one antenna to any of three radios, or from any of three antennas to one radio, is of no consequence.

Q. *Can I hook up my scanner to my satellite dish? (David Pemberton, E-mail)*

A. Yes, but you will only hear the 4 or 12 GHz TV satellites as you tune through the 950-1450 MHz range, since that's what is coming down the coax after it's been down-converted at the dish from the original C or Ku-band satellite frequencies.

And you would need to put a dc voltage-blocking device between your scanner and the coax splitter to remove control voltages on the coax provided by the TVRO receiver, which would have to remain on.

Q. *Is it true that you should not store a car battery on a cement floor? (Lon Palmer, Murphy, NC)*

A. Not for the reason you might suspect. It is an urban myth that a battery on a cement floor will discharge faster than one on a wood shelf, or in a vehicle. What could be different about a cement floor that would cause the discharge? The temperature? Humidity? Conductivity?

A battery mounted on its metal support in a car sitting outside on a cold, rainy day experiences far more of these influences than one on an indoor cement floor.

Apparently this myth originated with the observation that, if you took a battery out of a vehicle for storage, you weren't going to be using it. You'd likely set it in the corner, on the floor. After a few weeks — or months — it would self-discharge no matter where it was stored. Since it is heavy and often acid coated, leaving it on a garage floor is often the best choice.

The only difference you will note will be that the battery acid may trickle down on the floor and react with the lime in the cement, bubbling if wet, or at least bleaching the spot if slight. But none of this has anything whatsoever to do with the electrical discharge of the battery.

It's a myth. Just don't get acid on the floor; if you do spill some, neutralize it with a paste of baking soda (sodium bicarbonate) and water until it stops fizzling. And don't get the acid on your clothes (as I did with a nice, new jacket)!

Q. *What kind of portable emergency power supply should I use with various radios requiring different voltages? (Stanley Barnett, Booneville, MS)*

A. If it must be portable, then it should be a

Bob's Tip of the Month

Memory Keep-Alive When Changing Radio Batteries

Some clever tips from Paul Jablonowski of Greenfield, Wisconsin, require just a few minutes soldering skill for the technically adventurous, but prevents portable shortwave receivers from losing their clock and channel memories when batteries are changed.

Like many shortwave portables, the venerable Sony ICF-2010 utilizes two AA cells for its clock and other memory functions; when these are changed, all memory resets to the original factory default, requiring the user to re-enter the memory contents.

Paul discovered that simply soldering a 4700 microfarad, 16 volt, capacitor across the terminal lugs held memory contents for at least a half minute as he changed the AA cells. He found the capacitor at Radio Shack (part no. RSU 11935095, $1.49).

Carefully remove the seven Philips head screws (including one in the battery compartment) from the back, lifting the back off carefully. Paul mounted his capacitor near the top of the speaker, holding it with Velcro tape. Extending the leads, and observing the polarity, he soldered the leads to the lugs on the AA holder.

Paul notes that although there is a cloth tape to expedite the removal of the forward AA cell, it takes time to pry the other one out. He solved the problem by wrapping a piece of tape around the second cell, allowing enough excess to tape the ends together as a pull tab.

Nice suggestions, Paul; but don't forget — this modification could void your warranty.

rechargeable battery supply like the popular Grove Portable Power Station. You can select various voltages for operating any one accessory, and if you wish to operate more than one radio at a time, each with different voltages, you can plug in a three-outlet adaptor (Grove DCC-02) and enough selectable-voltage adaptors (DCC-03) to satisfy each radio's requirement. These adaptors come with a variety of plugs to fit nearly any electronic accessory.

***Q.** I have been scanning and shortwave listening for years, and now, MT's column, "The Launching Pad," has piqued my interest into satellite reception as well. I have been house hunting, but real estate agents don't have antenna restrictions on their databases, so they show me homes way out in the country where they see dishes and antennas. Have you any advice?*

A. My preference would be to move out into the country regardless of the antenna issue! But to answer your question more directly, there has been a great deal of successful action against restrictive covenants prohibiting the erection of antennas by property owners.

The Federal Communications Commission cites the Telecommunications Act of 1996 which protects dish owners from such restrictive covenants, and reaffirms its (the FCC's) empowerment to see that the electronic transfer of information is not impaired by punitive rules.

I would recommend that you look for antennas and dishes in the yards of prospective neighbors; spotting one — or not spotting any — ask a property owner if there is a policy.

Next, you may wish to contact that town council or its attorney, or the commissioners, or the city/town manager, or neighborhood association. This should get you started.

Finally, the American Radio Relay League (ARRL) in Newington, Connecticut, has a great deal of information regarding antenna restrictions and the rights of the radio amateur.

Good luck.

JRC NRD545 with VHF/UHF Converter

By Bob Grove

Some months ago, Larry Magne exposed our readers to the high-end NRD545 communications receiver from Japan Radio Company (JRC). For a basic description of this attractive receiver and its performance, we would refer our readers to that review in our August 1998 issue.

Now JRC has released an internal VHF/UHF converter, extending the receiver's frequency range to 2000 MHz (less cellular). So how does the 30-2000 MHz range of this receiver compare to its lower-cost, competitors, the ICOM R8500 and AOR AR5000 Plus? We confined our tests to 30-1000 MHz, the busiest part of the VHF/UHF spectrum.

Sensitivity is roughly equivalent, but selectivity choices would go to AOR first, ICOM next, and JRC third with only one narrow and one wide FM filter. The skirt selectivity characteristics of the narrow FM filter leaves a great deal to be desired; strong signals cause a dramatic elevation of the noise floor for approximately 200 kHz above and below the center carrier frequency, interfering with near-frequency reception.

There are quite a few spurious signals ("birdies") generated by the JRC, some severe. Several spurs between 40-50 MHz averaged S3 to S5 on the signal strength meter, but there was a 40 dB-over-S9 signal at 144.1 MHz, and even meter-pegging 70 dB-over-S9 spurs in the FM broadcast band and UHF military aircraft band.

Tuning dial speed may be selected from 1000, 500, or 250 steps per dial revolution; 250 seemed plenty fast enough, and I would have opted for even slower tuning as found on the competitor's receivers.

Step sizes for wide FM are appropriately 50 or 100 kHz. For narrow FM, while it would appear that the user may select from 5, 6.25, 9, 10, 12.5, 20, 25, 30, 50, or 100 kHz, these steps are factory-assigned to specific bands which don't necessarily match the American band plan. It is possible to mistune or miss entirely some frequencies unless the smallest step size (5 kHz) is selected. In some cases, as the tuning dial passed an arbitrary, factory-selected band edge, the step size would change, yet tuning back past that point wouldn't necessarily restore the former step size.

Background hiss and signal strengths decrease or increase noticeably as the dial is tuned over a band and, as the receiver automatically selects a different front-end filter, there is an abrupt change in attendant sensitivity.

Finally, there is no IF output jack on the rear panel, preventing the use of a spectrum display, video demodulator, or many other useful accessories without modifying the receiver, a serious oversight in a wide-frequency-coverage receiver that otherwise could be used by military, government, and commercial organizations.

The Bottom Line

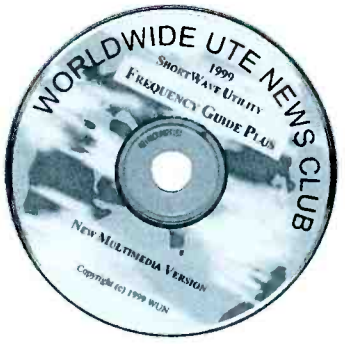
Is the converter useful with its host receiver? Absolutely. Sensitivity is comparable with its competitors, and the pushbutton selection of functions is easier than the AOR, and only slightly more cumbersome than the easy ICOM. But with its cost higher than that of either competitor, the performance should better match the appearance.

The NRD545 with converter is available for $2149.90 plus shipping from Grove Enterprises (800-438-8155), and is also available from other *MT* advertisers.

WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

Utility Frequency Bonanza



If you enjoy monitoring communications (utilities) on shortwave radio, or if you have wondered who is talking, beeping, or buzzing in the bands between international broadcasters, there is a compact disc (CD) you shouldn't be without. The World Utility Network (WUN) Frequency Guide is a CD packed with 30,000 frequencies which have all been logged between 1995-1999.

The disk also includes past issues of WUN and Speedx newsletters, and lots of pictures. "It's a utility listener's delight," says Larry Van Horn, former "Utility World" editor.

Quickly searchable by several different keys, it can help you narrow down who you may be hearing on the basis of who has been heard (and identified) working that frequency in the past. Other tools are also available to help you, including WAV files with samples of digital modes.

The information-packed CD, which works with Windows or can be read with an Internet browser, is a "steal" at $28.95 from Grove Enterprises (800-438-8155 or visit **www.grove-ent.com**)

Game Tracking for Bow-Hunters

Radio beacons and beepers have been used in applications from air and marine navigation to tracking stolen cars to tracking wildlife. One enterprising bow-hunter has devised a new application — the TrackMaster® Arrow Tracking System.

A tiny transmitter attached to a standard aluminum arrow activates the 49.89 MHz signal when the arrow is launched. Even if the arrow hits its mark, a deer may travel some distance before it goes down or it may be difficult to track. Using the hand-held receiver which contains a directional loop antenna, the hunter can use a series of three lights as visual cues or an audio tone through the earphone to locate the direction of the strongest signal. The signal allows him to track the game from an average distance of 500 yards (1000 yards maximum).

The transmitter is turned off by touching it to a magnet contained in the receiver unit. With sturdy construction and an expected life of 80 hours, the transmitter can be retrieved and reused for years. That's fortunate, since each transmitter is $79, and the Recover 1000 receiver is $221

— but then, what hobby is cheap these days?

For more information about the TrackMaster system, call 724-532-1350 or visit **www.TrackMasterATS.com**

Dog Tracking for Game Hunters

Hunting isn't just big business in our neck of the woods — it's a way of life. Critical to these hunters are their dogs, which represent a huge investment of time and money, so it's understandable that most dogs wear tracking collars. In fact, the state is considering requiring unleashed hunting dogs to wear tracking collars for the protection of game and property.

Grove Enterprises recommends the Alinco DJ-X10T or the AOR AR8200 handheld, wideband receivers for tracking these collar transmitters, which typically broadcast in the 169-216 MHz range. Up to 1000 frequencies can be entered, and the channels can be identified by collar number, name, color, etc. Depending on the terrain, reception can be expected from 2 to 3 miles.

For the purpose of tracking, a telescoping antenna or directional antenna is recommended instead of the antenna provided with the radio. The Alinco DJ-X10T is $389.95 and the AOR AR8200 is $569.95 from Grove Enterprises (800-438-8155 or visit **www.grove-ent.com**)

Flight Tracking on the Internet

Want to track the aircraft you just heard on the radio in real time? Or would you like to know when to leave for the airport to pick up Aunt Matilda? Go to **http://www.thetrip.com/usertools/flighttracking/** and enter the flight number, and you can see the plane's position, heading, air speed, and altitude. The site even has a beta release of E-mail Flight Notification that can notify up to three people when Aunt Matilda's flight lands!

A professional version, for which you have to register, can view all flights at one airport, view multiple airports, monitor flights within a specified time frame, etc. It's free for a 14-day trial period. Thanks to Bill Crocker for tipping us to this one.

AM Broadcast Station Antenna Systems

For nearly 80 years, domestic broadcasters have inhabited the 540-1600 (now 1700) kHz portion of the medium wave band, numbering now almost 5000 licensees. While design of high power broadcasting stations for this frequency range is similar to those for shortwave, antenna design is another matter.

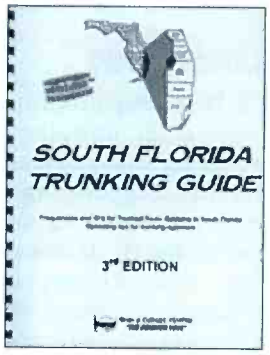
Patrick M. Griffith, whose byline has appeared previously

in *MT*, takes the reader on a pictorial guided tour of various antenna sites, with easy-to-understand chapters explaining propagation, feedpoint design, directional patterning, FCC regulations and station classes, and even a handy glossary of terms.

$15.95 plus shipping from the National Radio Club (PO Box 5711, Topeka, KS 66605-0711), Universal Radio (1280 Aida Dr., Reynoldsburg, OH 43068), and the author (via his Web page: **www.angelfire.com/co/antenna**).

South Florida Trunking Guide

South Florida boasts one of the busiest two-way radio concentrations in the nation, and much of it is conducted by trunked communications. Keeping up with public safety and business



trunking assignments is a difficult task, but Brian Cathcart, KE4PMJ, has been doing it well.

More than two dozen locales on the lower southeast Florida coast are detailed in this Third Edition, and listings include not only Motorola, but Johnson LTR and GE/Ericsson EDACS systems. This book is particularly useful for the new generation scanning receivers with trunk-tracking capability, like the Optocom reviewed this month.

Listening and identification tips are provided, along with general suggestions about scanners and settings for trunking reception. More information is available from Brian's Web site: **scannerdude@juno.com**.

South Florida Trunking Guide is $14.95 plus $2.50 shipping from the author (Brian Cathcart, 4050 Edgewood Dr., Coconut Creek, FL 33066-1835).

NEW ELECTRONICS BOOKS FROM MCGRAW-HILL

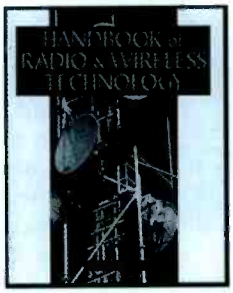
Encyclopedia of Electronic Circuits, Volume 7, by Rudolf F. Graf and William Sheets

Gleaned from numerous electronics publications, and printed on over 1000 pages, this new edition contains more than 1000 schematic circuits covering virtually every imaginable phase of electronic applications. A cumulative index provides additional references to the previous six

volumes in the series.

Radio technicians and experimenters will appreciate the contributions for active antennas, amateur radio, crystal oscillators and crystal radios, seismic radio beacons, wind speed and weather vanes, receiver accessories, antenna noise bridges and tuners, Tesla coils and Theremins, power supplies, timers, motor controls, field strength meters and signal detectors, audio amplifiers, audio and code practice oscillators, battery testers, automotive accessories, RF amplifiers and preamplifiers, flashing and strobe lights, and many more.

ISBN #0-07-015116-4, $39.95 plus shipping from McGraw-Hill, (800) 262-4729



Handbook of Radio and Wireless Technology by Stan Gibilisco

Radio professionals and amateurs alike have learned to respect this author's byline which has appeared in numerous publications, including his own books, for some two decades. His newest work is no exception to his reputation for knowledge and clarity in writing.

Handbook evolves from basic electronics, including components theory, through electromagnetics and radio wave propagation, into the technology of design. Receivers, transmitters, antennas, power supplies, television, digital communications, optical systems, computers and networking, space communications, navigational satellites, test equipment security systems, noise and filtering.

This is a fine introductory book for the technically interested, and an excellent tutorial for the experienced technician as well.

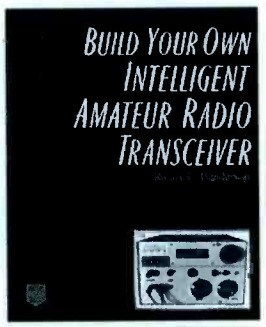
ISBN #0-07-023024-2, $449.95 plus shipping from McGraw-Hill, (800) 262-4729.

How Radio Signals Work by Jim Sinclair

For those listening hobbyists who want to learn more about radio communications and the behavior of signals, but without the math, Sinclair's book is an excellent choice. Written by an Australian, there are a few regional flavorings (or is that "flavourings?") in spelling and terminology, but since it's all in English, it's easy to translate!

Concentrating on shortwave listening, microwave communications, radar, satellites, and beacons, Sinclair's basics walk us through wavelengths and frequencies, signal propagation and its anomalies, modes of modulation, antennas ("aerials"), and a nice glossary of terms as well.

ISBN #0-07-058058-8, $24.95 plus shipping from McGraw-Hill, (800) 262-4729.



Build Your Own Intelligent Amateur Radio Transceiver by Randy L. Henderson

Are there still a few stalwart hams out there who want to accept the task, acquire the parts, warm up the soldering iron, smell the rosin solder, endure the burned fingers, and build their own gear? We would hope so. If you are one of these, Henderson's missal is for you!

At more than 360 pages, with foil and component views of the etching patterns (100% size) for all subsystems, this work details the design and layout of a microprocessor controlled, HF, SSB/CW amateur transceiver. It's not for the faint of heart, however, nor for beginners. But if you have a hankering — and the savvy — to build a fairly sophisticated rig, this is a good place to start.

ISBN #0-07-028264-1, $29.95 plus shipping from McGraw-Hill, (800) 262-4729.

Business News

• R.L. Drake has put their manuals online for download at **www.rldrake.com/products**

• Agrelo Engineering of Pattersonville, New York, manufacturer of the DF Jr direction-finding unit, says it has appointed SWS Security of Street, Maryland, as exclusive distributor for Agrelo's DF and transmitter products. Agrelo President Joe Agrelo, N2OOC, apologized for problems with delivery and support of Agrelo Engineering amateur products and says his company in the future will concentrate on the commercial market and "divest ourselves of sales and support" for its amateur line.

All inquiries should go to SWS, 1300 Boyd Rd, Street, MD 21154-1836; tel 410 879-4035; e-mail sales@swssec.com; **http://www.swssec.com**. Agrelo said SWS would be releasing upgrades, options, and enhancements to the DF Jr as well as new accessories and complete DF systems.

Free Stuff

• Sheldon Harvey, owner of Radio H.F. in Quebec, Canada, has launched a free monthly email newsletter whose intent is to help subscribers zero in on sites of use and fun in a number of categories, but especially relevant to radio. I found several interesting sites in the very first issue, such as a real-time web-cam on the Panama Canal at **http://www.pancanal.com/photo/camera-java.html** and *Strategy Magazine*'s worldwide military information in English at **http://www.strategy.gr/english/mil-en1.htm**.

The distribution list will be private: to subscribe or unsubscribe, send your email to Sheldon at <*ve2shw@yahoo.com*>. Radio H.F., as the sponsor, includes their monthly specials and other radio activities in the Publicity Zone.

• George Murphy, VE3ERP, is always coming out with new versions of his HamCalc disk crammed with free software of interest to radio hobbyists. Although you may find versions on the internet, to be sure you get the most recent release (ver 38 as of Mar 99), send US$5 (worldwide) to George Murphy VE3ERP, 77 McKenzie Street, Orilia, ON L3V 6A6, Canada. ($6 with required GWBASIC.EXE included)

• Interested in metal detectors? Fisher Research Laboratory publishes *World Treasure News*, a free newsletter packed with titillating topics to whet your appetite. The sample issue discussed hunting for meteorites, metal detector competitions, legal issues in treasure hunting, archaeological expeditions using metal detectors, discovery of a buried coin horde, locating round wires at a Coast Guard radio station, location of fired cartridges as crime scene evidence, diving for treasure trove, Civil War artifact locating, and much more.

For your free subscription, write to Fisher Research Laboratory, Dept. MT, 200 W. Willmott Rd., Los Banos, CA 93635, or phone (209) 826-3292, fax (209) 826-0416, or e-mail *info@fisherlab.com*.

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902
Press releases may be faxed to 828-837-2216 or e-mailed to mteditor@grove-ent.com.

LETTERS TO THE EDITOR

NEWS AND VIEWS FROM OUR READERS — Rachel Baughman, Editor

Surveys a Success!

Over the month of February, Grove Enterprises received more than 1700 completed surveys from the form which was enclosed in Grove's spring catalog. The information and comments will be tremendously useful to the company and to our magazine to help us serve you better — although by your comments, you are already well pleased! As soon as the responses are tabulated, we'll let you in on the results.

As promised, on March 1st we threw all the surveys into a huge box, and Sue Hamby, Tech Support Manager, drew the winning name. Elbert Jones of Houston, Texas, was the lucky winner of a Sony ICF-SW30. Congratulations! And our thanks to all of you for investing the time to answer that long list of questions.

RFI DFing: a lost art?

Vern Modeland says "I've just finished my latest visit to your **grove-ent.com** pages and enjoyed it as always. Well-written and thought-provoking articles and commentary brought to mind something else to wonder and ponder about. "

Modeland says when he first moved to Flippin, Arkansas, about two years ago, the noise level was about an S-2 and S-3 noise level on the lower amateur bands, but suddenly it was measuring S-7 and S-8, particularly on 40 meters.

"I checked my wiring and grounds and did a little driving around with the MFJ shortwave converter on the pickup's radio going and determined the local service utility grid was the culprit.

"I called, got the toll-free run-around, but persisted until I got someone to talk to. They promised to 'look into it,' and nothing happened. I called the PSC and spoke with its last employee designated to handle such consumer complaints. He lost his job in a force reduction but managed to jingle someone's bell at the utility's headquarters.

"Soon, I heard from an engineer who told me he had custody of the only radio frequency interference (RFI) snooping gear they had in the northern half of the state! He did come, arriving with three local utility employees and a service truck. They assured themselves they could find no way to blame my home or installation for the problem, and heard it themselves on the Kenwood.

"They went to the field, spent a day driving around (while I listened on my new scanner from Grove), and found the problem much where I said it was. It was fixed. The noise died down for a time, but has returned. And, in sampling other hobbyists, I find there is general concurrence that background noises are higher than they've been in years.

"Long story, but I submit that deregulation and lack of attention to such things by the utility industry are adding to the radio noise clutter. What do you think?"

Bob Grove, to whom this email was directed, replied, "I think you're right. I and many of our fellow hobbyists/readers are experiencing the same 'run-around.'"

The Right to listen

"Regarding Bob Grove's *Closing Comments* in the March issue, I would say that citizens have absolutely no right to listen to private communications. The difference is, I don't believe any communication on the radio waves is private.

"The government only has a legitimate power to regulate our actions when we violate the equal rights of others. My equal right to monitor a frequency in no way diminishes your right to transmit on that frequency. Rather than granting the government a power to create a right of privacy where none exists naturally, I would prefer to support your right to encrypt your transmission. That would be your responsibility to protect your privacy, not the government's.

"I believe this position is consistent with the Jeffersonian/Libertarian principles that our Constitutional concept of rights is based on — Liberty is the freedom to do whatever we want to do that does not violate the equal rights of others. Justice is the obligation to respect the rights of others."

— Jay Steimel, Lincoln, Arkansas

Todd Schroder of Virginia wrote to Congressman Thomas Davis regarding HR 514, and forwarded to us the reply he received. Like Jay Steimel above, Todd asks, "why is it the government's responsibility to ensure privacy to consumers using radios (wireless communications devices)?"

He makes an observation that sums up the recommended approach. *"The technology Mr. Davis refers to as a threat to privacy and protection is the same technology that can protect consumer's privacy, and that burden should be on the providers of said services."*

George Zeller (2nd from right) visits with David Clark, Chuck Rippel, and James Goodwin in Toronto. All of these radios, and plenty more not in the picture, belong to Dave. Photographer: Tony Ward.

Feedback on Y2K

"Thanks for being a voice of reason in what promises to be a period of chaos and irrational behavior as the millennium approaches.

"I am a software developer with many years' experience and have used mainframes, minis, and PCs. From my own experience, the impact we'll see on 1/1/2000 with the Y2K 'bug' will be limited and will pale in comparison to the problems that will surface as a result of the fear and panic the uninformed and misinformed will cause. One local organization has purchased not one but three ten kilowatt generators to power a 'collective' survival area, freezers and so on when the power fails on 1/1/2000.

"I worked for a power company in the late eighties, and much of what we coded then was Y2K compliant. It had to be, it was company policy. We didn't call it Y2K compliance then, of course. We were just trying to make sure what we did was as bug-free as possible."

— Mark Clark, via email

"The year 2000 problem is as Mr. Grove explained in his *Closing Comments* — more of an inconvenience than a disaster. But one should check to make sure it is not a disaster," says Greg Majewski, who sent us a program called **Y2Kdiag.zip**, a PC-based program that checks the hardware portion (mother board BIOS and real time clock) and the operating system portion of the problem.

He says, "The reason most 'experts' are not thrilled with these types of programs is that they do not address the applications. For example, I use Quicken Version 4.0 for my

STOCK EXCHANGE

Monitoring Times assumes no responsibility for misrepresented merchandise.

Ads for **Stock Exchange** must be received 45 days prior to publication date. All ads must be paid in advance to *Monitoring Times*.
Ad copy must be typed for legibility.

NON-COMMERCIAL SUBSCRIBER RATES: $.25 per word — *Subscribers only!* All merchandise must be personal and radio-related.

COMMERCIAL, NON-SUBSCRIBER, AND MULTIPLE SALES RATES: $1.00 per word. Commercial line ads printed in bold type.

1-3/4" SQUARE DISPLAY AD: $50 per issue if camera-ready copy or, $85 if copy to be typeset. Photo-reduction $5 additional charge. For more information on commercial ads, contact Beth Leinbach, 828-389-4007.

R-390A SERVICE / Rick Mish. Repair - Alignment - Touch up. Flat-rate $350 including return shipping. 419-255-6220, 9am - 9pm ET.

SHORTWAVE BROADCASTERS–NEWS SERVICES–GOVERNMENT AGENCIES You can easily control MF-HF-VHF-UHF receivers and transceivers worldwide with the Radphone 2000DX from www.pca.cc Phone +61-2-98889777 Fax +61-2-98050253

MAHLON LOOMIS, INVENTOR OF RADIO, by Thomas Appleby. $25 plus $5 S/H to SVANHOLM RESEARCH LABORATORIES, PO Box 81, Washington, DC 20044.

ELECTRONIC COMPONENTS. Parts bonanza for manufacturers, engineers, hobbyists. Thousands of chip capacitors, resistors, transistors, ICs, diodes, plus valuable items such as signal strength meters, LCDs, hardware, much more! All at a fraction of the original cost. Grove Enterprises, Inc., 828-837-9200, order@grove-ent.com

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SWAP: ICOM R7100 unblocked receiver in sealed box with warranty for SONY HR marked monitor or 15x, 4.6°+ field of view binocular or McIntosh 4200 receiver or make other offer. Tel Rcdg/Fax 310-841-6878.

FOR SALE: PRO 43 handheld scanner. Unblocked 800 MHz coverage. Leather carry case. $250 free shipping. 701-772-5016, braseth@gfherald.infi.net

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FOR SALE: KENWOOD R-1000, very excellent, $240. YAESU FRG-9600 V-UHF all mode receiver, excellent, $350. PRO-2006, excellent, $325. WB9YCJ/6, 714-564-9010.

Letters, continued from page 101

check book and savings. This is a old MSDOS program, but it does not have the year 2000 problem; the first release of Excel for Windows does.

"But it is also useful to ensure your computer will at least start up and work. Running the program on my system here at home shows if I run my system through 00:00 1 Jan. 2000, then I may have a problem. If I leave it off, which I have checked, then there is no problem. I run either Windows 95 or WindowsNT; both have a Y2K fix applied."

— Greg Majewski, via email

Then there's the secretary who said to her boss ....."To be honest, this *'Y to K'* thing doesn't make much sense to me. Anyway, I have finished converting the months on all the company calendars, so that the year 2000 now has Januark, Februark, Mak, and Julk.....!" (Blame Assistant Editor Larry Van Horn for that one!)

We hope you have enjoyed this issue, loosely organized around direction finding and FCC issues. Stay tuned for more good stuff in June!

— Rachel Baughn,
mteditor@grove-ent.com

Reader feedback is always welcome at P.O. Box 98, Brasstown, NC 28902 or via email to mteditor@grove-ent.com.

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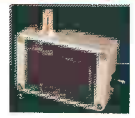


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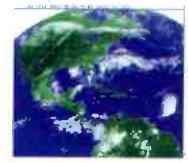
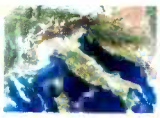
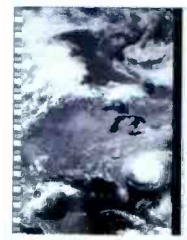





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CLOSING COMMENTS

By Bob Grove, Publisher

The FCC on the Hot Seat

In 1934 the United States Congress created the Federal Communications Commission, outlining its specific responsibilities. Since then the FCC has assumed more and more responsibilities, and has grown correspondingly larger to handle the meteoric growth of our telecommunications age.

Over the past few years, and more intensely recently, the Commission has drawn constant fire from Congress, charged with being oversized, unwieldy, inefficient, bureaucratic, politically influenced—in other words, much like Congress.

Punished continuously by Congress by having its budget reduced and its work load increased, and even threatened with complete extinction, the FCC has now been directed by Congress to endure a total overhaul, either from within or from without.

Why has the Commission been the target for such punitively-directed assaults? After all, isn't the FCC just another government agency? Yes, but as an independent agency like the Postal Service and the National Security Agency, its members are appointed by the (currently Democratic) White House, not the (currently Republican) Congress which has oversight authority only.

The more one learns about the way our nation's capitol is *really* run, the more one doesn't like it. Is this another example of partisan power play rather than good government? We've seen a lot of that lately.

The specific Congressional conclave authorized to taunt the FCC is the now-too-familiar House Subcommittee on Telecommunications, Trade, and Consumer Protection, chaired by Louisiana's Billy Tauzin. Yes, this is the same group that brought us the ill-founded and poorly-written anti-scanner Bill, HR2369, which, though totally rewritten, was mercifully defeated by a perceptive Senate subcommittee last year. Hopefully, the Senate subcommittee will exhibit the same sensibility this year toward the identical bill, HR514.

In the meantime, however, the new Bill's sponsor, Rep. Heather Wilson, parrots Tauzin's obsolete and erroneous statement: "Off-the-shelf scanners can be easily modified to turn them into electronic stalking devices." No they can't, and they haven't been for a long time. That rattling sword is showing considerable rust.

Tauzin knows how to work a crowd. At a recent meeting of the National Association of Broadcasters (a major sponsor of his), he lashed out at the FCC for proposing a low-powered FM broadcasting service for small communities, openly admitting that it would cut into the revenues of big-bucks broadcasters. He accused the Commission of "coercion and extortion" in their reviews of proposed mergers in the telecommunications industry.

Recently appointed FCC Chairman William Kennard is bucking up well, perhaps stoically. He has promised to "dramatically transform" his Commission on several fronts, with three specific focus areas: consumer protection (and universal service), enforcement, and spectrum management. He also warned that this transitional period must not be used "as a back-door way to re-open the Telecom(munications) Act."

Kennard's caveat follows Tauzin's published intent to drastically emasculate the FCC—abolish rules that seem unnecessary, turn many present FCC empowerments over to the private sector, combining bureaus which have similar duties.

Neither Tauzin nor Kennard has a substantive plan in place yet, but both hope to within the next few months. Kennard's goal is to structure the agency along functional rather than technological lines, now that the distinction between wire, wireless, satellite, broadcast, and cable communications have become blurred. According to his announcement last fall, the first step in this process is to take place in October 1999, when all enforcement functions (as featured in this month's cover story) will be consolidated into a new Enforcement Bureau. The public information functions of the current Compliance and Information Bureau and the Office of Public Affairs will be consolidated into a new Public Information Bureau.

In the meantime, Tauzin and his subcommittee continue to be the regular recipients of cash contributions from the very industries he has been appointed to regulate. Am I the only one who sees something wrong in this? Does the phrase "conflict of interest" come to mind? And when do influential financial donations to a politician who regulates the interests of the contributor cease being a "campaign contribution" and become bribery?

What became of statesmanship? Where have the heroes and role models gone? Regardless of the outcome of this sorry debacle, the retirement of the 106th Congress will leave a disgraceful legacy of special interest corruption, abuse of power, hypocrisy, self interest, petty partisan politics, vacuous and sanctimonious oratory, and abdication of public trust — Or is this just business as usual?

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